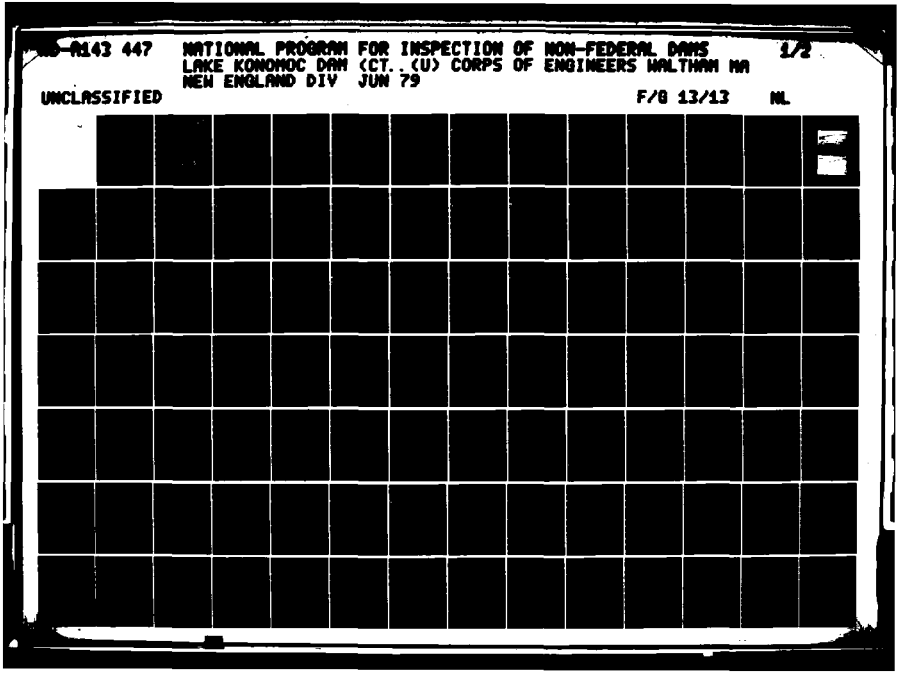
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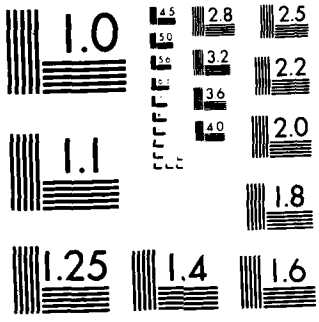

NIANTIC RIVER BASIN
WATERFORD, CONNECTICUT

LAKE KONOMOC DAM

CT. 00152

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Niantic River Basin
Waterford, Conn.
Lake Konomoc Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Lake Konomoc Dam is an earthfill dam with a concrete core, about 540 ft. long, with a maximum height of about 23 ft. The dam is abutted by an earthfill dike at each end. The dam and dikes are judged to be in generally fair condition owing to the absence of adequate dewatering facilities. Lake Konomac is utilized as a water storage facility for the City of New London.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:

NEDED

OCT 2 1979

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

I am forwarding to you a copy of the Lake Konomoc Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, City of New London, Connecticut.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

LAKE KONOMOC DAM

CT 00152

NIANTIC RIVER
WATERFORD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	CT 00152
Name of Dam:	Lake Konomoc Dam
Town:	Waterford
County and State:	New London County, Connecticut
Stream:	Lakes Pond Brook
Date of Inspection:	25 April and 9 May 1979

BRIEF ASSESSMENT

Lake Konomoc Dam is an earthfill dam with a concrete core, about 540 ft. long, with a maximum height of about 23 ft. The dam is abutted by an earthfill dike at each end. Two other earthfill dikes form the lake closure: Davis Pond Dike at the north end of the lake, and Great Swamp Dike located on the northeast shore of the lake. A double side channel, "U" shaped spillway, constructed of reinforced concrete, is located at about the mid-point of the dam. A pumping station, located just east of the dam has a normal capacity of about 6 to 8 cfs (4 to 5 mgd) and a maximum capacity of 17 to 18.5 cfs (11 to 12 mgd) with all facilities operating. There are no other outlet facilities for draining the lake.

Lake Konomac is utilized as a water storage facility for the City of New London. It is about 10,800 feet long and has a surface of 299 acres at spillway crest level. The drainage area is 1.38 sq. mi. (883 acres) and the maximum storage to top of dam is 4,660 acre-feet; the size classification is thus intermediate. Because a breach of the dam could affect several homes, two local roads, two State highways and Interstate Highway 95, with the possibility of some loss of life and the probability of appreciable economic losses, it has been classified as having a high hazard potential.

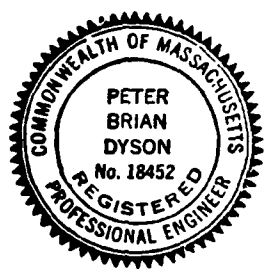
The dam and dikes are judged to be in generally fair condition owing to the absence of adequate dewatering facilities. The spillway is adequate to pass the PMF test flood inflow of 4,500 cfs without overtopping the dam or dikes; the maximum outflow being 1,120 cfs at water surface elevation 189.7 MSL. The spillway capacity at top of dam, elevation 191.0 MSL, is 1,845 cfs.

Within two years of receipt of the Phase I Inspection Report, the owner, the City of New London, should retain the services of a competent registered professional engineer, and implement the results of his evaluation of the following: (1) determine the need for a means of draining the lake in the event of an emergency; (2) review spillway flow conditions under test flood outflows and determine whether the stilling basin riprap should be removed; and (3) investigate the seepage in two zones at the toe of the natural slope east of the dam.

The owner should also carry out the following operational and maintenance procedures: (1) remove silt and vegetation from the discharge channel; (2) reinstate the riprap at the ends of the spillway walls; (3) remove brush and growth

from Davis Pond Dike and Great Swamp Dike; (4) backfill the rodent burrow near the west spillway wall and monitor the embankment for new burrows; (5) monitor flows across the spillway discharge apron on a daily basis for abnormal changes; (6) clear forest litter from the filters at the toe of the natural slope to the east of the main dam; (7) monitor the seepage in two zones at the toe of the natural slope east of the dam not less than once per month, to observe flow characteristics and changes in turbidity; (8) institute procedures for an annual periodic technical inspection; and (9) establish a formal surveillance and flood warning plan.

Peter B. Dyson
Project Manager



This Phase I Inspection Report on Lake Konomoc Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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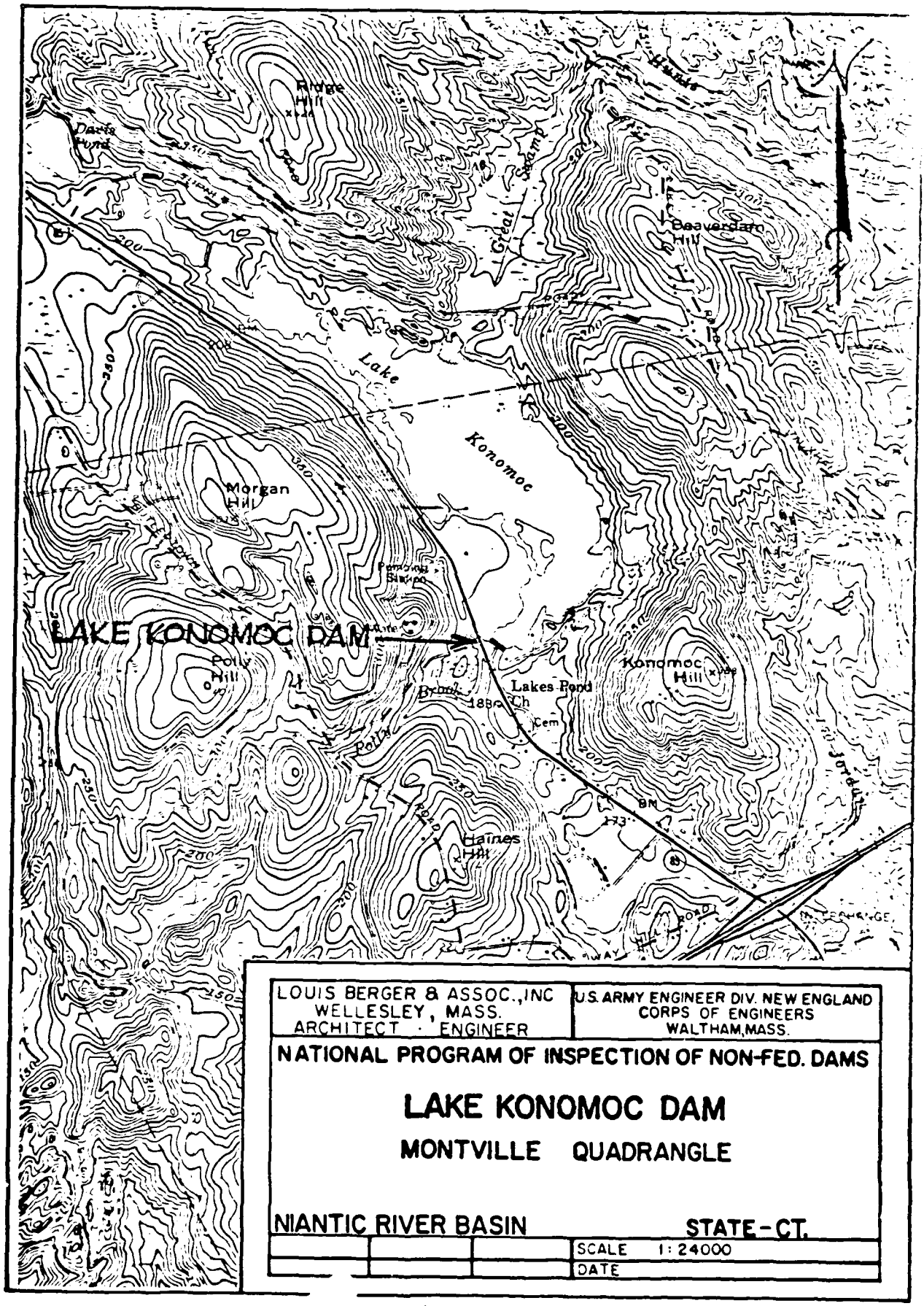
APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

LAKE KONOMOC RESERVOIR DAM

Overview from Left Abutment

Overview from Right Abutment



LOUIS BERGER & ASSOC., INC WELLESLEY, MASS. ARCHITECT · ENGINEER	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE KONOMOC DAM

MONTVILLE QUADRANGLE

NIANTIC RIVER BASIN STATE - CT.

			SCALE 1:24000
			DATE

PHASE I INSPECTION REPORT

LAKE KONOMOC DAM CT 00152

Section 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsiblity of supervising the inspection of dams within the New England Region. Louis Berger & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to Louis Berger & Associates, Inc. under a letter of 19 March 1979 from John P. Chandler, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0051 has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. Lake Konomoc Dam is located in New London County in the Town of Waterford in southeastern Connecticut. Lake Konomoc forms the headwaters of Lakes Pond Brook approximately 2.8 miles upstream from the confluence of Lakes Pond Brook and the Niantic River. The dam is reached via Connecticut Routes 52 and 85. It is shown on U.S.G.S. Quadrangle, Niantic, Connecticut with coordinates approximately at N 41° 23' 52", W 72° 10' 52".

b. Description of Dam and Appurtenances.

(1) Description of Dam. The dam is an earth embankment closing off the outlet channel of Lake Konomoc. The dam is about 23 ft. high and about 540 ft. long, of rolled earthfill construction with a concrete core. The dam was raised and reconstructed in 1968-69, the new dam being superimposed over an existing smaller earth dam with a concrete core and the old gate and intake structure shown on sheet 1 of 6 in Appendix B being plugged and abandoned. In the center portion of the dam, for a distance of about 250 ft., the upstream face of the dam is nearly vertical, being formed by the concrete core wall. In this section the dam has a top width of 12 ft. The remaining portion of the dam is 18 ft.

wide at the crest with a variably sloping upstream face. The entire upstream side of the dam is riprap protected. The downstream face of the dam is on a 3 to 1 slope and is grass covered. (See Appendix B for drawings of the dam and the likes described below.)

A 20 in. diameter cast iron pipe serves as the supply main to Lake Konomoc from Davis Pond. A valve box and stem are located on the Lake Konomoc side of Davis Pond Dike.

(2) Left Abutment Dike. The left abutment dike, about 300 ft. long, is of rolled earthfill construction. It is 18 ft. wide at the crest with a 2½ horizontal to 1 vertical upstream riprapped face. The downstream face is grass covered with a variable slope, blending into the existing ground.

(3) Right Abutment Dike. The right abutment dike, about 900 ft. long, is also of rolled earthfill construction. It is 18 ft. wide at the crest with an 8 horizontal to 1 vertical upstream face and a 3 to 1 downstream face. The crest and both upstream and downstream slopes are grass covered.

(4) Great Swamp Dike. Great Swamp Dike is located on the northeast side of Lake Konomoc. It is about 11 ft. high and about 380 ft. long. It is of rolled earthfill construction with a crest width of 18 ft. The upstream face has a slope of 8 horizontal to 1 vertical, the downstream face has a slope of 3 to 1, and both slopes are grass covered.

(5) Davis Pond Dike. Davis Pond Dike is an earth embankment carrying Turner Road and is part of the watershed divide which separates Davis Pond and Lake Konomoc. It was in existence before the 1968-69 reconstruction.

(6) Spillway. The spillway for Konomoc Lake Dam is located at about the midpoint of the dam. It is a double side channel, "U" shaped spillway constructed of reinforced concrete. It has an overall length of 51.67 ft. along the crest. The water spills onto a slightly downstream sloping concrete slab and then travels down a 1.7 horizontal to 1 vertical concrete chute to a stilling basin. Saw-toothed baffle blocks close the downstream end of the basin and the entire stilling basin is filled with riprap to the top of the baffle blocks.

c. Size Classification. Konomoc Lake Dam is about 23 ft. high above downstream toe level, impounding a maximum of about 3,000 acre-ft. of active storage to spillway crest level, and about 4,630 acre-ft. to top of dam. In accordance with the height and storage capacity criteria given in Recommended Guidelines for Safety Inspection of Dams, storage capacity governs and therefore the project is classified as intermediate.

d. Hazard Classification. A breach failure of Konomoc Lake Dam would release water down Lakes Pond Brook to its confluence with the Niantic River about 2.8 mi. below the dam. State Highway 85 is located 300 ft. downstream of the dam. A large flow in the brook would cause a washout of this highway. Lakes Pond Brook passes under four other roadways, two state highways and two local roads, before reaching the Niantic River. These roadways, as well as about fourteen homes and an automobile racetrack, would sustain damage if a major breach of the dam should occur. In accordance with Recommended Guidelines for Safety Inspection of Dams, Konomoc Lake Dam has therefore been classified as having a high hazard potential.

e. Ownership. [illegible]ed by the City of New London, Connecticut.

f. Operator. Mr. Terrance [illegible]
New London Wa[illegible]partment
New London, Co[illegible]ecticut

Telephone (203) 443-2861

g. Purpose of Dam. Lake Konomoc Dam is operated in conjunction with other water storage facilities, for providing municipal water supplies to the City of New London.

h. Design and Construction History. The original Lake Konomoc Dam was built in 1872. No documentation on design or construction has been recovered for the original dam. The dam was raised and reconstructed in 1968-69 to increase water storage capacity for the City of New London. The reconstructed dam was designed by Fay, Spofford and Thorndike, Engineers, of Boston, Massachusetts. Construction plans and a limited amount of hydraulic design data were recovered (see Appendix B).

i. Normal Operating Procedure. No written operating procedures were disclosed. Operators are on duty at the pumping station located at Lake Konomoc. There is no outlet for the dam other than the pumping facilities. The operators make a daily check of reservoir conditions.

1.3 Pertinent Data

a. Drainage Area. The drainage area contributing to Lake Konomoc is situated at the headwaters of Lakes Pond Brook. The drainage area encompasses a total of about 1.38 sq. mi. (883 acres), of which 227 acres are occupied by the reservoir. There are no defined stream courses contributing to the reservoir. The longest overland course to the lake is about 3,000 ft. long with an elevation difference of about 214 ft., or at a slope of about 375 ft. per mile. The drainage area has a length of about 1.9 miles and a maximum width of about 0.85 miles. The basin consists of both open fields and forested areas, with sparse population.

b. Discharge at Damsite.

(1) Outlet Works Conduit. There are no outlet works for Lake Konomoc Dam. The pumping station at the lake supplies inflows into the City of New London's domestic water supply system.

(2) Maximum Known Flood at Damsite. No records are available of flood inflows into Lake Konomoc, nor of spillway releases and surcharge heads during such inflows.

(3) Ungated Spillway Capacity at Top of Dam. The spillway for Lake Konomoc Dam occupies the center portion of the dam, being a "U" shaped double side channel concrete spillway. The total length of the overflow section is 51.67 ft., having an assumed effective length of 50.0 ft. Computations give a spillway capacity of about 1,845 cfs with reservoir level at top of dam, elevation 191.0 MSL.

(4) Ungated Spillway Capacity at Test Flood Elevation. The ungated spillway capacity is 1,120 cfs at test flood elevation 189.7 MSL.

(5) Gated Spillway Capacity at Normal Pool Elevation. Not applicable.

(6) Gated Spillway Capacity at Test Flood Elevation. Not applicable.

(7) Total Spillway Capacity at Test Flood Elevation. The total spillway capacity at the test flood elevation is the same as (4) above, 1,120 cfs at elevation 189.7 MSL.

(8) Total Project Discharge at Test Flood Elevation. Since the dam is not overtopped by the test flood, the total project discharge is the same as (7) above: 1,120 cfs at elevation 189.7 MSL.

c. Elevations (Ft. above MSL)

(1) Streambed at centerline of dam - 168.0

(2) Maximum tailwater - Not computed

(3) Upstream invert of outlet culvert - None

(4) Recreation Pool - Not applicable

(5) Full flood control pool - Not applicable

(6) Ungated spillway crest - 186.0

(7) Design surcharge - Unknown

(8) Test flood design surcharge - 189.7

(9) Top of dam - 191.0
Top of left abutment dike - 191.0
Top of right abutment dike - 191.0
Top of Great Swamp Dike - 191.0
Top of Davis Pond Dike - varies from 196.0 to 198.0

d. Reservoir

(1) Length of Maximum pool - 10,800 ft.

(2) Length of recreation pool - Not applicable

(3) Length of flood control pool - Not applicable

e. Storage (acre-ft.)

(1) Recreation pool - Not applicable

(2) Flood control Pool - Not applicable

(3) Spillway crest pool El. 186.0 MSL - 2,980

(4) Test flood pool El. 189.7 MSL - 4,100

(5) Top of dam El. 191.0 MSL - 4,600

f. Reservoir Surface (acres)

(1) Recreation pool - Not applicable

(2) Flood control pool - Not applicable

(3) Spillway crest El. 186.0 MSL - 299

(4) Test flood pool El. 189.7 MSL - 354

(5) Top of dam El. 191.0 MSL - 363

g. Dam

- Main Dam

(1) Type - Earthfill with concrete core wall

(2) Length - 540 ft.

(3) Height - 23 ft.

(4) Top Width - 12 ft., with vertical concrete upstream face wall and
18 ft., with sloping earth upstream face

(5) Side Slopes - Upstream - 260 ft. of vertical concrete core wall
280 ft. of 2 to 1 riprapped face
Downstream - 3 horizontal to 1 vertical

(6) Zoning - Homogeneous rolled fill with concrete core wall

(7) Impervious Core - Vertical concrete wall

(8) Cutoff - Core wall, extension to bedrock unknown

(9) Grout Curtain - Unknown

- Left Abutment Dike

(1) Type - Earthfill

(2) Length - 300 ft.

(3) Height - Varies, 10 ft. maximum

(4) Top Width - 18 ft.

(5) Side Slopes - Upstream - 2½ horizontal to 1 vertical riprapped
Downstream - Varies

(6) Zoning - Homogeneous rolled fill

(7) Impervious Core - None

(8) Cutoff - None

(9) Grout Curtain - None

- Right Abutment Dike

(1) Type - Earthfill

(2) Length - 900 ft.

(3) Height - Varies, 7 ft. maximum

(4) Top Width - 18 Ft.

(5) Side Slopes - Upstream 8 horizontal to 1 vertical
Downstream 3 horizontal to 1 vertical

(6) Zoning - Homogeneous rolled earthfill

(7) Impervious Core - None

(8) Cutoff - None

(9) Grout Curtain - None

- Great Swamp Dike

(1) Type - Earthfill

(2) Length - 380 ft.

(3) Height - Varies, 11 ft. maximum

(4) Top Width - 18 ft.

(5) Side Slopes - Upstream 8 horizontal to 1 vertical
Downstream 3 horizontal to 1 vertical

(6) Zoning - Homogeneous rolled earthfill

(7) Impervious Core - None

(8) Cutoff - None

(9) Grout Curtain - None

- Davis Pond Dike

(1) Type - Earthfill

(2) Length - 95 ft.

(3) Height - Varies, 10 ft. maximum

(4) Top Width - 20 ft.

(5) Side Slopes - About 2 horizontal to 1 vertical

(6) Zoning - Unknown

(7) Impervious Core - Unknown

(8) Cutoff - Unknown

(9) Grout Curtain - Unknown

h. Spillway

(1) Type - Double side channel, "U" shaped

(2) Length of Weir - 51.67 ft.

(3) Crest Elevation - 186.0 ft.

(4) Gates - None

(5) Upstream Channel - None

(6) Downstream Channel - Converging concrete chute 150 ft. long containing concrete baffle blocks and riprap. Flows directed to channelized stream.

i. Regulating Outlets - None

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No data on the design of the original nineteenth century dam exists. The 1968-69 reconstruction of the dam was designed by Fay, Spofford, and Thorndike, Engineers, of Boston, Massachusetts. Copies of as-built drawings are included in Appendix B.

2.2 Construction Data

No information relating to construction of the original dam has been found. The reconstructed dam was completed in 1969 by contract under the supervision of the design engineers. The contractor for construction was Frank J. Shields, Inc., of Southbridge, Massachusetts. Macchi & Hoffman, Engineers, inspected the work on behalf of the State Water Resources Commission. A certificate of approval for the work was issued on February 25, 1971. A limited amount of correspondence has been located relative to construction, copies of which are included in Appendix B. The State's consultant expressed concern about leaks appearing in the form of boils near the toe of the dam adjacent to the spillway. Corrective measures to stop the leaks during the construction period were taken. There was no visual evidence of leaks in this area during the inspection of the dam on 25 April and 9 May 1979.

2.3 Operation Data

No specific operation data or operation and maintenance manuals have been issued, either by the design engineers or by the operating agency. Operation of the facilities is a responsibility of the Water Supply Department, City of New London. A piezometer is located at the dam in the vicinity of where the above mentioned leak occurred. According to Water Department personnel the piezometer is monitored on a daily basis and functions well, following closely the rise and fall of the lake. On 24 April 1979, the water level was about 20 ft. below the top of pipe.

2.4 Evaluation Data

a. Availability. The reconstruction plans, correspondence concerning construction of the dam and appurtenances, previous inspection reports, and the visual observations of the inspection team form the basis for the information presented in this report.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgement.

c. Validity. The validity of the engineering data acquired covering the dam and Great Swamp Dike is considered acceptable and is not challenged.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General. The visual inspection of Lake Konomoc Dam took place on 25 April and 9 May 1979. The reservoir level was about 1.5 ft. below the spillway crest. Both the dam and the dikes were judged to be fair condition owing to the absence of adequate dewatering facilities. There was no evidence of any major problems, but a few items require attention (see Sections 7.2 and 7.3).

The dam is an earth "rolled fill" embankment with a 500 ft. concrete core. The dam was reconstructed in 1968-69 and raised 7.5 ft. An impermeable 85 ft. wide blanket was placed on the upstream slope. Graded filters, with 6 in. dia. corrugated metal pipe (CMP) drains were incorporated into the downstream toe. They issue below the spillway chute side walls into the spillway race through a V-notched weir for determination of flow through the filter drains (graduated from 0 to 14 cfs). A piezometer on the downstream slope extends into the filter. Records indicate that the dam was persistently troubled with boils during construction, and special attention was paid to the problem areas during this inspection.

b. Dam.

1. Main Dam. The dam embankment has been generally well maintained, there being little brush or other growth present, but weeds are beginning to invade the crest and the downstream slope. On the upstream slope, weed and brush are beginning to intrude through the riprap (see Photo Nos. 1 and 2, Appendix C).

The piezometer half-way down the left slope was inspected, and was operative. According to Water Department personnel, the piezometer continues to respond well, following closely the rise and fall of the lake; the day before the inspection, the water level was about 20 ft. below the top of pipe, or within the filter.

The toe of the dam, for its entire length beyond the spillway area, was firm. In the area immediately to the west of the spillway walls, two soft areas were noted, but were not attended by moistness.

Each toe drain was flowing at about 0.5 gpm, the flows being without turbidity. Although "as-builts" indicate both drain inverts to be the same, the west drain appeared somewhat lower, being about one-quarter immersed in the slightly backed-up flow in the discharge channel.

One burrowing rodent hole was observed about 15 ft. west of the end of the west spillway wall.

2. Left Abutment Dike. To the east of the main dam, downslope from the gravel access road opposite the pumping station, several areas of distinct, persistent and rather widespread seepage were evident, draining southerly through an extensive swamp. The more southerly of these zones, according to the "as-builts", is provided with a graded filter about 150 ft. long, 15 ft. wide, and is located about 20 ft. below design flow line (elevation 186 to 166). In this

area, at least 10 individual seeps, presumably through the filter, could be identified, each at about 0.1 to 0.2 gpm, but flowing clear with no fines in suspension, and all joining to form a fairly well defined stream passing through the poorly drained and wooded swamp. The filter can no longer be clearly defined, now being covered with forest litter. Water Department personnel state that these seeps have not changed appreciably in their characteristics since reconstruction of the dam (see Photo No. 3, Appendix C).

Some 200 yards farther northeast along the gravel road, there is a so-called "frog pond" to the left of the road which prior to the raising of the dam was said by Water Department personnel to have been almost dry. After the raising of the dam the "frog pond", separated from the lake by a natural ridge, filled and its water elevation now follows the water surface of Lake Konomoc. Opposite the "frog pond", across the road to the south, a prominent seep issues at the toe of the slope from an area covered with rotted boards. The seep was once excavated and boxed-out in order to provide a convenient source of fresh spring water for pumping station workers. The spring flows probably at the rate of more than 2 gpm. As it flows to the south through a boggy and marshy area it picks up the many seeps issuing from the filtered zone, and quite possibly from other natural seeps. The entire toe of the slope, and locally well above the toe, is very soft and saturated (see Photo No. 4, Appendix C).

3. Right Abutment Dike. No seepage was observed along the toe of the right abutment dike, which is in a similar condition to the main dam (see Photo No. 5, Appendix C).

4. Great Swamp Dike. The Great Swamp Dike on the northeast side of Lake Konomoc is a "rolled fill" embankment with an 18 ft. crest, a flat 8 to 1 upstream slope and a 3 to 1 downstream slope. The dike is badly overgrown with small scrub brush, and at the toe of the dike on the swamp side, there is an extensive marshy area with standing water extending almost the entire length of the dike. While the drawings show a paved ditch originally extending from the road to the toe of the dike, it is not now apparent. According to Water Department personnel, the water at the toe of the dike is from the swamp proper, and before construction of the dike, the water in the stone ditch shown on the drawing flowed from the swamp to the lake (see Photo Nos. 6, 7 and 8, Appendix C).

5. Davis Pond Dike. The Davis Pond Dike at the extreme westerly end of Lake Konomoc essentially consists of Turner Road proper, faced on the lake side by 5 ft. fill on a very flat slope, about 150 ft. long. On the north side, the water elevation is at the toe of the road embankment, and the retained pond has the appearance of a mangrove swamp with uprooted trees and much dead vegetation. Height from water surface on the north side to the road surface is about 8 ft. On the slopes of the swamp side of the road young saplings are abundant and at the toe of the slope several large trees are present, most of them dead. Similarly, the downstream slope of the dike is also host to young saplings and vegetation (see Photo Nos. 9 and 10, Appendix C).

c. Appurtenant Structures

1. Spillway. The spillway occupies the center portion of the dam being a "U" shaped, double side channel, concrete spillway. The total length of the overflow section is 51.67 ft. Although no flow was passing over the spillway at the time of the inspection, the spillway channel below the baffle blocks

transported a slight but steady flow a[illegible] its wi[illegible]ading either ground water intrusion through defective conc[illegible]ete slabs, o[illegible]release of rain water or spillway flow retained in the 3.5 ft. thick bou[illegible]e[illegible]the stilling basin. However, the "as-builts" indicate the joints of the s[illegible] to have been equipped with rubber waterstops; there are no weep holes and little or no precipitation is said to have occurred for some period before the inspection. Site personnel stated that this moisture has been evident almost from the completion of construction (see Photo Nos. 11, 12, 13 and 14, Appendix C).

The spillway concrete is in good condition, but the slope riprap at the end of the spillway training walls has become dislodged.

Concrete cracks were noted in the spillway at a construction joint on the inner walls of the chute section, where the chute starts making a transition from a 20 ft. width to a width of 12 ft (Appendix C, Photo No. 15).

2. Pumping Station. The pumping station located at the northern end of the left abutment dike is 10 years old and appears to be well maintained and in good operating condition.

d. Reservoir Area. Lake Konomoc lies in a bowl of hills, the slopes of which are generally well-forested and stable. The shore of the lake is on a gentle gradient and as the impoundment is a public water supply, it is frequently patrolled and inspected.

e. Downstream Channel. Siltation and growth has become excessive in the discharge channel, so that the validity of the flow determinations through the V-notched weir is questionable. At the time of the inspection the flow through the weir was 4 in., (1.2 gpm) slightly higher than revealed in earlier documented inspections, but still consistent with the expected flow from the filter drains. However, readings should be reconfirmed after channel clearance (see Photo No. 16, Appendix C).

About 300 ft. downstream of the dam is located a 36 in. dia. pipe under State Route 85. After flowing through this the channel is in a relatively wide valley until it reaches Way Hill Road and the Connecticut Turnpike. After crossing under these roadways the stream valley is narrow and has a steeper slope until it reaches the Niantic River.

3.2 Evaluation

The visual inspection has adequately revealed key characteristics of the dam, as they may relate to its stability and integrity. The dam and appurtenant works are judged to be in fair condition owing to the absence of dewatering facilities. Seepage was noted at several locations along the toe of the left abutment dike and brush and tree growth are becoming well established on both Great Swamp and Davis Pond Dike. Under high flow conditions the riprap in the stilling basin may cause damage to the baffle blocks.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures

The Lake Konomoc Dam is operated by personnel of the New London Water Department. Operations are limited, as there are no outlet facilities at the dam. Lake levels are controlled by a 20 in. inflow pipe from Davis Pond and outgoing pumping facilities located at the lake. No documented operating procedures have been prepared.

4.2 Maintenance of Dam

Maintenance is carried out as required by City personnel. This consists of periodic mowing along the main dam and its abutment dikes, cutting of brush on the Great Swamp Dike, and the cutting of growth in the channel between the spillway chute and State Route 85.

4.3 Maintenance of Operating Facilities

Except for the housekeeping maintenance noted above, no specific maintenance program is in effect. There are no outlet facilities to maintain.

4.4 Warning System

No warning system is in effect for Lake Konomoc Dam.

4.5 Evaluation

The Lake Konomoc Dam is of recent construction with no outlet operating devices, and as such, requires no detailed operating procedures. Maintenance involves periodic growth removal from the dam and dikes and surveillance regarding seeps, slope damage, animal burrows, etc. A formal warning system should be developed.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General. Lake Konomoc Dam is an earthfill dam impounding a storage of about 2,980 acre-ft. at spillway crest elevation with provision for an additional 1,680 acre-ft. of capacity in its surcharge space to top of dam. It is basically a high surcharge - medium spillage facility used for water supply purposes. The spillway is capable of discharging about 1,845 cfs with a surcharge to the top of dam. The general topographic characteristic of the 1.38 sq. mi. (883 acres) drainage basin is best described as rolling terrain, which rises from elevation 186.0 at spillway crest to elevation 405 MSL. The area is generally forested.

b. Design Data. The rehabilitation of Lake Konomoc Dam was designed in 1967 by Fay, Spofford & Thorndike, Engineers, of Boston, MA. No hydrologic computations or data were recovered. According to correspondence found in the State of Connecticut files, the"U"shaped spillway crest has an overall length of 51.67 ft. with an effective weir length assumed to be 50.0 ft.

c. Experience Data. No records are available in regard to past operation of the reservoir, nor of surcharge encroachments and flows through the spillway. The maximum past inflows are unknown.

d. Visual Observations. At the time of the visual inspection of the dam, the reservoir level was about 1.5 ft. below the crest of the spillway. There was no evidence either along the lake or in the downstream channel to indicate high water levels or signs of major spillway outflows. No one contacted could recall any such occurrences.

e. Test Flood Analysis. Hydrologic characteristics of Lake Konomoc Dam and drainage area were evaluated in accordance with criteria given in Recommended Guidelines for Safety Inspection of Dams. As indicated in Section 1.2, paragraphs c and d, Lake Konomoc Dam is classified as intermediate size and has a high hazard potential. The recommended range of test floods for hydraulic evaluation of such a dam is between ½ PMF and PMF. Because normal lake storage is large in relation to storage capacity of downstream valleys, the risk of damage to downstream interests would extend for the entire stream length of Lakes Pond Brook. The full PMF was therefore selected as appropriate for evaluation of the dam.

Precipitation data was obtained from Hydrometeorological Report No. 33, which for the Connecticut area approximates 24.0 inches or 6-hour point rainfall over a 10 square mile area. This value was then reduced by 20 percent to allow for basin shape and fit factors. The 6-hour rainfall duration curve of a total of 19.2 inches was then distributed and rearranged as suggested in Design of Small Dams. A constant loss factor of 0.1 inches per hour was deducted from the precipitation values to give the excess rainfall used to prepare an inflow hydrograph.

Since the reservoir area comprises about 35 percent of the total drainage area, the precipitation on the lake was separated from that on the overland portion. For the lake itself, the precipitation was assumed as instantaneous runoff, with rectangular incremental hydrographs. For overland runoff, a triangular incremental hydrograph was assumed, using a computed lag time value of about 1.04 hours to derive a time-to-peak for the traingular hydrograph of 1.26 hours (see computations on Sheets D-7 to D-10, Appendix D). A PMF inflow hydrograph is shown on Sheet D-11, indicating a peak inflow of about 4,500 cfs or a CSM of about 3,260.

Routing the combined PMF inflow hydrograph through the lake and spillway results in a combined outflow of 1,120 cfs at elevation 189.7 MSL, with a freeboard to top of dam of 1.3 ft. A graphic flood routing is shown on Sheet D-12, Appendix D.

f. Dam Failure Analysis. A breach owing to structural failure of the dam by piping or sloughing is a possibility. For this analysis a breach was assumed with water level at the PMF surcharge elevation of 189.7 MSL. The "rule of thumb" criteria suggested in the NED March 1978 Guidance Report was used for the breach analysis. With a breach length of 40 percent of the dam length at mid-height, or about 120 ft., an outflow of about 21,500 cfs, which includes 1,120 cfs through the spillway, would be realized.

In the reach immediately below the dam, outflows pass through a 36 in. dia. pipe under State Route 85 located about 300 ft. downstream of the dam. There is about a 30 ft. difference in elevation between the top of dam and the crest of roadway. It is expected there would be no significant backwater effects on the spillway's discharge capacity. The water then flows through a relatively wide valley with an average slope of about 16 ft. per mile until reaching Way Hill Road and the Connecticut Turnpike (State Route 52). After crossing under these roadways the stream valley narrows and the stream slope then averages about 95 ft. per mile. The stream continues to follow this narrow valley until it passes under Interstate Route 95. About 1,500 ft. below Interstate Route 95 the stream outlets into the Niantic River.

An outflow of 21,500 cfs from Konomoc Lake would produce a flood depth of about 20 ft. in the valley below the dam. In this reach the dam failure would cause about a 14 ft. rise in water stage above the spillway discharge stage. It would cause major flooding of State Route 85 and damage about seven homes. In the next reach which extends to the Connecticut Turnpike it is estimated that the stage would rise by about 7.5 ft. to a stage of 11.5 ft. In this reach Way Hill Road, an automobile race track and two homes would sustain major damage. In the reach extending from the Connecticut Turnpike to the Niantic River it is estimated that the brook would rise about 7.0 ft. to a stage of about 11.0 ft. and that five homes would sustain damage.

In summary, about 14 homes, a racetrack, two local roads, and a two lane state highway (Route 85) are within the area of potential flooding. The Connecticut Turnpike and Interstate Route 95 also might sustain damage. Figure 5, Sheet D-18, Appendix D, shows the area of potential flooding.

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation. The field investigations of the embankment revealed no significant displacement or distress which would warrant the preparation of slope stability computations based on assumed soil properties and engineering factors.

b. Design and Construction Data. Construction plans for the dam were reviewed. However, no data or calculations of value to a stability assessment for this dam were retrieved.

c. Operating Records. There are no operating records of any significance to structural stability.

d. Post Construction Changes. No post construction changes are known which would adversely affect dam stability.

e. Seismic Stability. The dam is located in Seismic Zone No. 1, and in accordance with Phase I guidelines, does not warrant seismic analysis.

SECTION 7
ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. On the basis of the Phase I visual examination, Lake Konomoc Dam appears to be in fair condition owing to a lack of adequate dewatering facilities.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency. The recommendations and remedial measures enumerated below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations

It is recommended that the City of New London retain the services of a competent registered professional engineer to make further investigations of the following, and should implement the results:

1. Evaluate the need for providing a means to safely drain the reservoir.

2. Review spillway flow conditions under test flood outflows and determine whether the riprap in the stilling basin should be removed to prevent possible damage to the baffle blocks.

3. Investigate the relatively high volumes of seepage in two zones at the toe of natural slope east of the dam and pumping station; determine the advisability of incorporating a graded filter with channelization, and V-notched weirs for assessment of flow changes.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. Siltation and vegetation in the discharge channel should be removed. After the channel is cleared, flows through the V-notched weir should be reconfirmed and effects on piezometer readings should be noted.

2. Displaced riprap at the ends of the spillway walls should be reinstated.

3. Brush and growth should be removed from the Davis Pond Dike, particularly the mature and dead trees on the north side of Turner Road.

4. Brush growth on the Great Swamp Dike should be removed and kept clear in the future.

5. The rodent burrow near the west spillway wall should be backfilled. The necessity for rodent control measures should be considered.

6. Observations of flows across the spillway discharge apron below the stilling basin should be made daily, and abnormal changes investigated by removing riprap at selected locations to inspect the concrete slabs and joints.

7. The filters at the toe of natural slope to the east of the left abutment dike and across the access road should be cleared of forest litter, their limits defined and discharges channelized.

8. The seepage in two zones at the toe of natural slope, east of the left abutment dike and the pumping station, should be monitored not less than once per month, to observe flow characteristics and changes in turbidity.

9. Procedures for an annual periodic technical inspection of the dam, dikes and appurtenant works should be instituted.

10. A formal surveillance and flood warning plan should be developed, including round-the-clock monitoring during heavy rainfall.

7.4 Alternatives

There appear to be no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Lake Konomoc Dam

DATE 25 April and 9 May 1979

TIME 9:00 A.M.

WEATHER 25 April - Cloudy & Cold
9 May - Clear & Hot

W.S. ELEV. 184.5 U.S. N/A DN.S.

PARTY:

1. Peter B. Dyson
2. Pasquale E. Corsetti
3. Carl J. Hoffman
4. Roger F. Berry
5. James Reynolds
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydrologic	Roger F. Berry	
2.	Hydraulic/Structures	Carl J. Hoffman	
3.	Soils and Geology	James Reynolds	
4.	General Features	Peter B. Dyson	
5.	General Features	Pasquale E. Corsetti	
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Konomoc Dam DATE 25 April & 9 May 1979

PROJECT FEATURE Dam NAME J. Reynolds

DISCIPLINE Soils/Structures NAME C. Hoffman

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	191.0 MSL
Current Pool Elevation	184.5 MSL
Maximum Impoundment to Date	Unknown
Surface Cracks	One non-active rodent burrow, 15 ft. west of the end of the west wall.
Pavement Condition	N/A
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	None on Dam - well patrolled
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	See Note #1, next page
Piping or Boils	None
Foundation Drainage Features	Toe filters, with 6" CMP drains functioning well. Discharge measured by V-notched weir.
Toe Drains	One each side of spillway
Instrumentation System	Piezometer to elevation of toe filter operative - V-notched weir.

NOTE #1: East of dam, at toe of natural slope across access road, 200 ft. long section with more than 10 seeps at 0.1 gpm each, at location of graded filter installed during construction. Major seep issuing at 5.0 gpm 200 yards north of foregoing location. All seeps clear flowing, but detritus covers filtered area.

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Konomoc Dam DATE 25 April & 9 May 1979

PROJECT FEATURE Great Swamp Dike NAME J. Reynolds

DISCIPLINE Soils/Structures NAME C. Hoffman

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
Crest Elevation	191.0 MSL
Current Pool Elevation	184.5 MSL
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	N/A
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	None
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Frequent trespass evident
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Konomoc Dam DATE 25 April & 9 May 1979

PROJECT FEATURE Davis Pond Dike NAME J. Reynolds

DISCIPLINE Soils/Structures NAME C. Hoffman

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
Crest Elevation	196.0
Current Pool Elevation	184.5 MSL
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Good - minor cracks
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	None evident
Sloughing or Erosion of Slopes or Abutments	None evident
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None evident
Unusual Embankment or Downstream Seepage	None evident
Piping or Boils	None evident
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

PERIODIC INSPECTION CHECKLIST

PROJECT Lake Konomoc Dam DATE 9 May 1979

PROJECT FEATURE Spillway NAME Carl Hoffman

DISCIPLINE Hydraulics/Structures NAME

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	N/A
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	Very minor
Spalling	Very minor
Any Visible Reinforcing	No
Any Seepage or Efflorescence	Seepage on apron below spillway chute
Drain Holes	None
c. Discharge Channel	
General Condition	Fair
Loose Rock Overhanging Channel	No
Trees Overhanging Channel	No
Floor of Channel	Silt and Vegetation
Other Obstructions	None visible

APPENDIX B

ENGINEERING DATA

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI, P.E.
E. HOFFMAN, P.E.
SAINT GIRARD

CONSULTANT
F. C. W. DUNHAM

4

July 10, 1972

State of Connecticut
Dept. of Environmental Protection
165 Capitol Avenue
Hartford, Conn. 06115

Attention Mr. Wm. H. O'Brien

Re: Konomoc Dam Waterford

Gentlemen:

Inspected the above-referenced dam on Friday, July 7, 1972. Pump house attendant, Mr. Kemp, was present.

Water level in the reservoir was even with the top of the spillway. Mr. Kemp said that the spillway was overflowing a few days ago at the end of a long rain period for the first time since the dam was rebuilt.

Checked from 6" dia. underdrain. The underdrain on the east side of the spillway was running about 1½" deep, water was clear. Drain is working properly. Underdrain on the west side of the spillway was carrying a small trickle of water. Checked for soft spots at the toe of dam; none were evident.

The Cipoletti weir across downstream of spillway was 5½" deep, about normal for quantity from underdrains.

The dam appears to be functioning satisfactorily under full head conditions.

No further inspections will be made unless requested.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

ACCHI & HOFFMAN ... EERS

:UTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN.. O ... (203) 525-6631

MA HI, P.E.
HOFFMAN, P.E.
E! GIRARD

IA' CONSULTANT
. C. W. DUNHAM

April 17, 1972

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut 06115

Attention: Mr. William H. O'Brien, III

Re: Konomoc Dam
Waterford, Conn.

Gentlemen:

An inspection was made on Monday, April 17, 1972, of the Cipoletti Wier on the run off stream which had a flow of 3" ± on this day.

The elevation of the reservoir was about 1-1/2 feet below the spillway.

Condition of the dam was found to be satisfactory.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

vmc

W.R.C.

MACCHI & HOFFMAN, ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN. 06105 • PHONE (203) 525-6631

A. J. MACCHI, P.E.
R. HOFFMAN, P.E.
RAEL GIRARD

CONSULTANT
DR. C. W. DUNHAM

May 27, 1971

STATE WATER RESOURCES COMMISSION
RECEIVED
MAY 28 1971
ANSWERED
REFERRED
FILED

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Conn. 06115

Attention Mr. William H. O'Brien III

Re: Konomoc Dam
Waterford, Conn.
Periodic Inspection

Gentlemen:

On Wednesday, May 26, 1971, A. J. Macchi and Peter Lozis of this office inspected the above-referenced dam.

Water level of reservoir was found to be 2'-3" below spillway.

Flow at wier was measured as 2-3/4" the same as it was during the past inspection.

Drains at sides of spillway are flowing about equal amounts of clear water.

Water level in observation well was measured as being about -13' - 9" below reservoir level.

Toe of dam is found to be firm.

All conditions were found satisfactory.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

7/1/50

STATE OF CONNECTICUT

WATER RESOURCES COMMISSION

STATE OFFICE BUILDING • HARTFORD, CONNECTICUT 06115

CERTIFICATE OF APPROVAL

February 25, 1971

ity of New London
unicipal Building
New London, Connecticut

ttn: Mr. Charles P. DeBiasi

TOWN: **Waterford**
RIVER: **Niantic River**
TRIBUTARY: **Lakes Pond Brook**
CODE NO.: **NI3.9 LPZ2.8**

NAME AND LOCATION OF STRUCTURE: **Konomoc Lake Dam located approximately 200 feet east of Route #85 and 1.1 miles north of the Connecticut urnpike intersection.**

ESCRIPTION OF STRUCTURE AND WORK PERFORMED: **This is an earth dam with a oncrete core wall. The plans called for raising the dam and cove all and raising and lengthening the spillway by constructing a U-shaped spillway cut into the lake. New wing walls and outlet hannel were also constructed.**

ONSTRUCTION PERMIT ISSUED UNDER DATE OF: **September 26, 1967**
DDITIONAL CONDITION: That monthly measurements be made and recorded f the lake level, piezometer level, and weir level and more often during long periods of above normal rain. This data shall be submitted yearly to the Water Resources Commission or immediately if (continue

This certifies that the work and construction included in the plans submitted, for the structure described above, has been completed to the tisfaction of this Commission and that this structure is hereby approved accordance with Section 25-114 of the 1958 Revision of the General Statutes.

The owner is required by law to record this Certificate in the land records of the town or towns in which the structure is located.

WATER RESOURCES COMMISSION

JC:WHO:rh

John J. Curry, Director

ADDITIONAL [illegible]ON: (continued) unusual readings are obtained.

HI & HOFFMAN • ENGINEERS

ICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-66

P.E.
ARD

CONSULTANT
C. W. DUNHAM

February 11, 1971

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William H. O'Brien, III

Re: Konomoc Dam
Waterford, Conn.

Gentlemen:

On Wednesday, February 10, 1971, I inspected the above-referenced dam.

The water level in the reservoir is still about 6' from the spillway crest.

There was about 3" of water flowing through the notched weir, same as during my previous inspection.

The toe shows no change from my previous inspection.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

September 28, 1970

Mr. A. J. Macchi
c/o Macchi - Hoffman Engineers
44 Gillett Street
Hartford, Connecticut

Re: Lake Konomoc Dam
Waterford

Dear John:

Thank you for your letter of September 23, 1970 concerning the seepage at the subject dam. We note that it is your opinion that the quantity of seepage is insufficient to cause concern.

We have also received your letter of September 21, 1970 regarding weir and piezometer. It is our intention to recommend at the next Commission meeting that a Certificate of Approval be issued for this dam with the additional requirement that these measurements be taken once a month except during long periods of above normal rainfall and submitted yearly to this Commission. If you feel that any additional requirements should now be made please advise us.

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHO'B:ljg

ACCHI & HOFFMAN • ENGINEER

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-66

A. J. MACCHI
R. HOFFMAN
J. SCHMID

ASSOCIATE CONSULTANT
C. W. DUNHAM

September 23, 1970

State of Connecticut
Water Resources Commission
State Office Building
Hartford, Conn. 06115

Attention Mr. William H. O'Brien, III

Re: Lake Konomoc Dam
Waterford, Conn.
Your Letter 9/18/70

Dear Mr. O'Brien:

It is my considered opinion that present minor leakage below the drain lines does not present a serious condition which effects the safety of the dam. These drain lines are laid within the filter blanket and some channeling along the bottom of the drain is bound to occur. The quantity is insufficient to cause concern.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI
E. S. HOFFMAN
J. SCHMID

ASSOCIATE CONSULTANT
REC. C. W. DUNHAM

September 21, 1970

State of Connecticut
Water Resources Commission
State Office Building
Hartford, Conn. 06115

Attention Mr. William H. O'Brien, III

Re: Lake Konomoc Dam
Waterford, Conn.

Dear Mr. O'Brien:

Pursuant to your letter dated September 17, 1970 and copy of letter enclosed of Fay, Spofford and Thorndike, Engineers, I have reviewed the contents of these letters and it is my considered opinion that measurements made once a month recording the lake level, piezometer level and weir level are adequate except if there is an occurrence of long period of above normal rain, which could cause a sudden increase in lake level. Then, more frequent measurements should be taken.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

September 18, 1970

Mr. A. J. Macchi
c/o Macchi & Hoffman, Engineers
44 Gillett Street
Hartford, Connecticut 06105

Re: Lake Konomoc Dam
Waterford

Dear John:

Thank you for your letter of September 9, 1970 on the subject dam.

Would you please advise us if the minor leaks observed at the bottom of the spillway surfacing below the drain lines represents a condition which effects the safety of the dam? Is this an indication of malfunctioning of the blanket filter drain? Is this an item which should be brought to the attention of the owners or one for which some action should be taken?

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHO:ljg

September 17, 1970

Mr. John Macchi
c/o Macchi-Hoffman Engineers
44 Gillett Street
Hartford, Connecticut

Re: Lake Konomoc Dam
Waterford

Dear John:

We are enclosing a copy of a letter dated September 9, 1970 from C. S. Mansfield of Fay, Spofford and Thorndike, Engineers with an attached graph showing water level rainfall and seepage records at the dam.

Would you please review the enclosed and send us your comments as to the desired frequency of taking these measurements, and of the desirability or necessity of submitting these records to this office to insure the safety of this structure.

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHOIII/mh

Enc.

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN. • PHONE (203) 525-6631

A. J. MACCHI
J. R. HOFFMAN
J. SCHMID

SOIL CONSULTANT
PROF. C. W. DUNHAM

September 9, 1970

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William H. O'Brien, III

Re: Konomoc Dam
Waterford, Conn.

Gentlemen:

On Friday, September 4, 1970 I inspected the above-referenced dam.

I noticed minor leaks at the bottom of the spillway surfacing below drain lines, the same as it has been from the beginning.

The flow at notched weir measured 2½" deep. The reservoir water level was about 3½' below spillway.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

FORD & THORNDIKE
ENGINEERS

11 BE ET • BOSTON, MASSACHUSETTS 02108
A A CODE 617 • 523-8300

September 9, 1970

Mr. William H. O'Brien III
Civil Engineer
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Subject: Lake Konomoc Dam

Dear Mr. O'Brien:

Enclosed please find a print of the record information plotted to date relative to leakage at Konomoc Dam. The print shows that the maximum Lake level has been within three feet of full pond, or about 3.2 feet above the old spillway level.

Flow readings at the weir are taken about 5 or 6 times each month. There is indication that the measured flow is influenced by rainfall; however, we believe that a meaningful relationship between Lake level and leakage can be established.

The water level in the piezometer rose about one foot for a Lake level increase of 6.5 feet, which is about as expected. To date, the piezometer level has not dropped to follow the one foot loss in Lake level.

We do not anticipate any overflow at Lake Konomoc, and no provisions have been made to measure same. There is only 1.6 square miles of tributary drainage area which is not adequate to supply the City's average daily water demand. Additional water required to fill the Lake is supplied through the pipe extending from the upper reservoir, by gravity or pumping. It is expected that the City will operate the system without wasting over the Konomoc spillway.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By

CSMansfield:bmt
WN-59 - 3
Enc.
cc: Mr. Charles P. deBiasi

PROJECT New London, Conn.

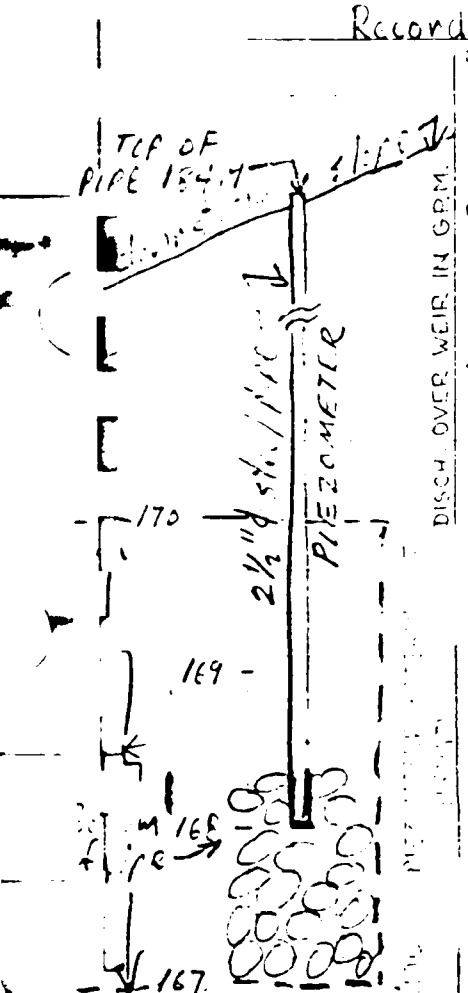
SUBJECT Water Level, Rainfall, Leakage — Records at Lake Konomoc Dam

SHEET NUMBER

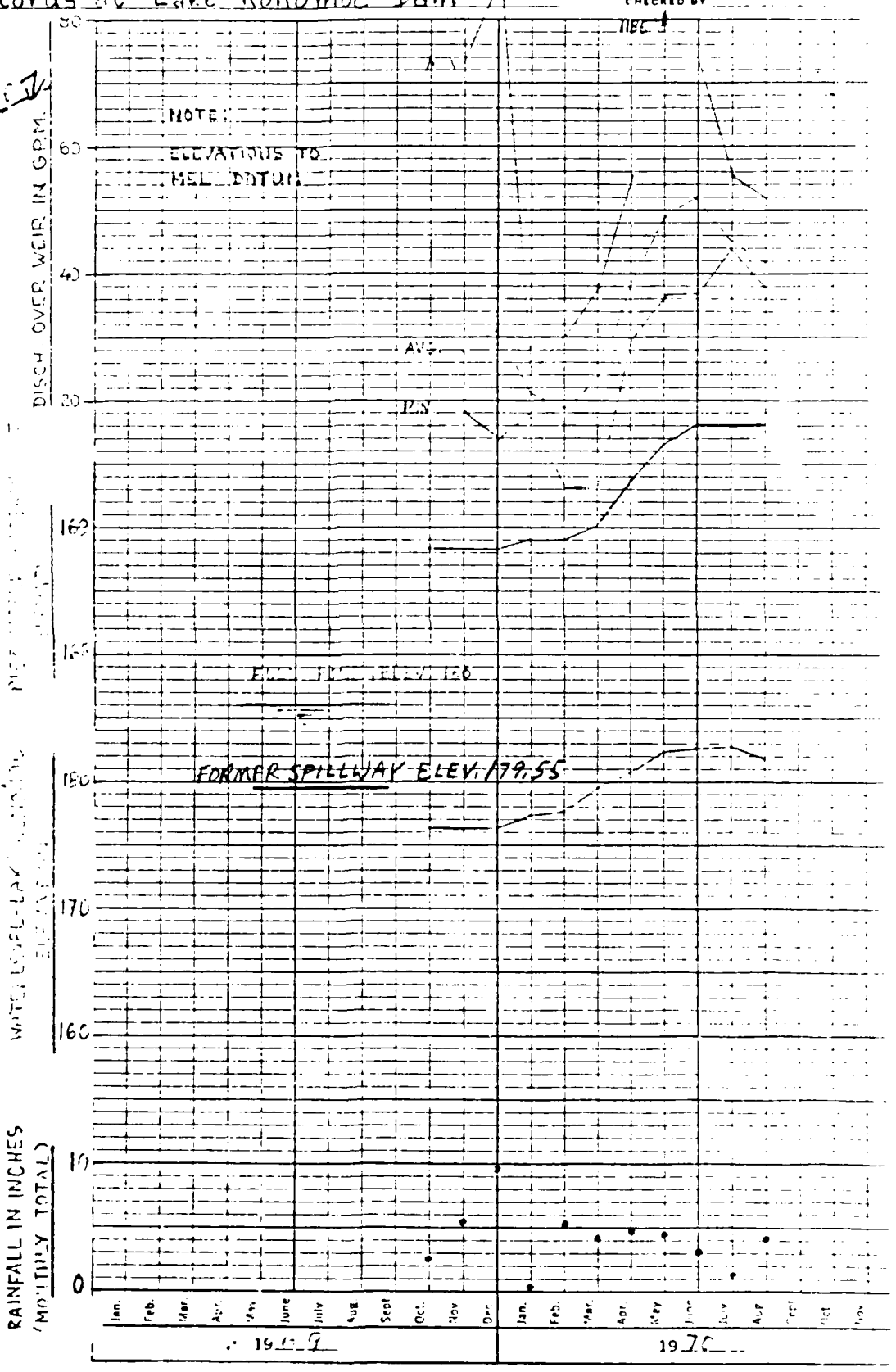
DATE 1974

COMPUTED BY

CHECKED BY



three foot thick sand [illegible] filter



May 4, 1970

C. S. Mansfield
Fay, Spofford and Thorndike
Engineers
11 Beacon Street
Boston, Massachusetts 02108

Re: Lake Konomoc Dam
Waterford

Dear Mr. Mansfield:

Thank you for your letter of March 30, 1970 concerning the subject dam. We note that the city is furnishing to your office information as to the weir flow and piezometer and lake level readings and that this information is being plotted monthly at your office.

We note that the weir installed in the downstream channel will measure spillway flow in addition to flow from the toe drains. Is it anticipated in the operation of the water levels that there will be flow over the spillway? If so, how is this flow to be subtracted from the weir reading to obtain toe drain flow?

We request that you send us a copy of your plotted monthly information when the water level has reached the spillway level or a stable condition.

Very truly yours,

William H. O'Brien III
Civil Engineer

WHOIII/lch
cc: A. J. Macchi
City of New London
Dept. of Public Works

...OW ...
...AKAL...
...OLL A. FARWELL
...PH W. HORNE
...LIA L. HYLAND
...IOL H. JONES
...ARD C. KEANE
...NK L. LINCOLN
...AM J. WILLIAMS

FAY, SPOFFORD & THORNDIKE
ENGINEERS

11 BEACON STREET • BOSTON, MASSACHUSETTS 02108
AREA CODE 617 • 523-8300

BRIDGES AND OTHER STRUCTURES
WATER SUPPLY AND SEWERAGE
PORT AND TERMINAL WORKS
INDUSTRIAL BUILDINGS
EXPRESS HIGHWAYS
AIRPORTS

VALUATIONS
...VEST GATIONS, DESIGNS
SERVICES ... JRING CONSTRUCTION

March 30, 1970

Mr. William H. O'Brien, III
Civil Engineer
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Subject: Lake Konomoc Dam

Dear Mr. O'Brien:

Please excuse our long delay before answering your January 13, 1970, letter. We felt that we might have some significant facts to report after the lake level had recovered to the former overflow level. Information recorded to date does not indicate any unexpected developments.

The City is furnishing to our office, on a monthly basis, the following:

a) The daily rainfall measurements recorded at Lake Konomoc pumping station.

b) Periodic readings of the water level in the piezometer.

c) Periodic readings of the flow over the weir.

d) Water level elevation observed at Lake Konomoc.

This information is being plotted monthly at our office. At this stage, the plot includes maximum and minimum flows over the weir, total rainfall in inches, and the water level in both the lake and piezometer to MSL datum.

The flow over the weir varies considerably with rainfall. This is to be expected as the weir was installed downstream to measure flow from

all known boils. Therefore, considerable runoff from the downstream side of the dam enters the brook above the weir.

The information reported for February shows water level in the lake to be 0.8 feet above the former spillway level.* The water level in the piezometer was 9.3 feet below the lake level which is approximately toe filter elevation, as expected. We feel that information recorded during the next few months as the lake level approaches the new spillway overflow elevation should provide answers for most of our present unknowns.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By

CSMansfield:ec
WN-59(3)
cc: Mr. Charles P. deBiasi

former s.w. level = 179.55
+ 0.8
lake level (Feb.) - - - 180.35 = 5.65' below proposed ℄ 186.00
- 9.3
level in piezometer — 171.05 ← 1.05' above top of 3' thick sand blanket

January 13, 1970

Mr. C. S. Mansfield
Fay, Spofford and Thorndike, Engineers
11 Beacon Street
Boston, Massachusetts

Subject: Lake Konomoc Dam, Waterford

Dear Mr. Mansfield:

Thank you for the information submitted on the subject dam and the as-built drawings.

We assume that the piezometer and weir construction were installed to monitor the phreatic seepage surface within the dam and the amount of such seepage. How is the water level checked in the piezometer? It is our opinion that the Town should be given some indication of the normal fluctuation in the weir and piezometer readings and be advised as to what readings would be abnormal, undesirable, or of concern and what actions should be taken in these eventualities. If this information has been supplied to them, please furnish us with copies.

Our consultant, A. J. Macchi, inspected the dam in November. His opinion was that the work appeared satisfactory and recommended that a Certificate of Approval be issued.

An early reply would be appreciated.

Very truly yours,

William H. O'Brien, III
Civil Engineer

WHOIII/tvm

cc: A. J. Macchi
Charles P. diBiasi

MACCHI & HOFFMAN • ENGINEERS

ECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

J. MACCHI
R. HOFFMAN
I. S. AMID

OCIATE CONSULTANT
OF. C. W. DUNHAM

November 17, 1969

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention: Mr. William H. O'Brien, III

Re: Konomoc Dam
~~New London,~~ Waterford Connecticut

Gentlemen:

On Friday, November 14, 1969, I inspected the above referenced project.

As was stated in Fay, Spofford & Thorndike's letter of November 7, 1969, the work for this project has been completed.

The measuring "V" notched weir has been installed downstream to the spillway as well as the pizometer within the dam, south of the spillway. The dam has been loamed and seeded.

On this day, water flowed through the notched weir to a depth of 2-3/4". Also on this day, the water level within the reservoir was still at the low level of previous visits.

Work appears satisfactory and we recommend that a Certificate of Approval be issued.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

F A. OWMAN
I M. CAHALY
ROLL A. FARWELL
PH HORNE
LIAI .. HYLAND
OLD H. JONES
'ARD C. KEANE
NK LINCOLN
FAR J. WILLIAMS

FAY, SPOFFORD & THORNDIKE
ENGINEERS
11 BEACON STREET • BOSTON, MASSACHUSETTS 02108
AREA CODE 617 • 523-8300

DAMS AND OTHER STRUCTURES
WATER SUPPLY AND SEWERAGE
PORT AND TERMINAL WORKS
INDUSTRIAL BUILDINGS
EXPRESS HIGHWAYS
AIRPORTS

VALUATIONS
INVESTIGATIONS, DESIGNS
SERVICES DURING CONSTRUCTION

November 7, 1969

State of Connecticut
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Attention: Mr. William H. O'Brien, III
Civil Engineer

Subject: New London, Connecticut
Reconstruction of Lake Konomoc Dam

Gentlemen:

Construction at Lake Konomoc Dam has been completed, and we have revised the Contract Drawings to provide a record of the work as built. An extra sheet has been compiled to show information requested in your August 27, 1969, letter.

A sharp crested "V" notch weir made of 3/4-inch marine grade plywood has been installed in the spillway race about 15 feet north of Route 85. The flow over the weir, water level in the piezometer and the reservoir level will be measured and recorded weekly by the City. To date, there have been no arrangements for periodic inspections other than normal analysis of the weir and water level readings.

A memo by Mr. Majeski, of our office, relative to soils data and filter design is enclosed for your file.

A complete set (seven prints) of record drawings for Lake Konomoc Dam reconstruction is being forwarded under separate cover for your file.

Please feel free to contact our office if we can be of further service.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By C. S. Mansfield

CSMansfield:ec
WN-59(3)
Enclosure
cc: Mr. Charles P. [illegible] Biasi
Mr. A. J. Macchi

August 27, 1969

Drilling & Grouting - Konomoc Lake Dam
New London Water Supply
New London, Connecticut

Client: Frank J. Shields Construction Co.

Engineers: Fay, Spofford & Thorndike, Inc.

Purpose - Inject AM-9 chemical grout to seal around two large diameter pipes underlying the dam from a previous installation. The top of these pipes were approximately 23 feet below top of spillway.

Equipment was mobilized Monday, August 11, 1969. It was considered possible to jet or drive grout pipes to a depth of 26 feet. These holes would be injected with grout as they were withdrawn in stages from 26 feet back to 21 feet. Holes would be backfil with grout.

A total of fourteen 1½" diameter pipe holes were put down to a refusal depth of 20 ft. Dye tests failed to show at the exposed leak at the toe of the dam. Three pipes were left in place.

Diamond core drilling was mobilized to allow drilling through the obstructions. Three BX size cased holes were installed. Hole 1-A drilled through granite and contacted the cast iron pipe at 23 feet, as evidenced by sound and iron cuttings in the return drill water. No attempt was made to drill through the pipe.

Hole 2A was located to penetrate between the two pipes which were spaced approximately four feet apart. This hole was drilled through granite rock at 20 ft. to 22 ft. 6inch and continued to a depth of 26 feet.

hole 3A was drilled to a depth of 27 ft. No granite slabs were contacted with this ho

Dye tests were carried out on these three holes with negative results.

Hole Number 3A was injected with 120gallons of AM-9 chemical grout. It was subsequent backfilled with 17 gallons of cement grout.

Hole Number 2A was injected with 90 gallons of AM-9 chemical grout. It was subsequently backfilled with 18 gallons of cement grout.

Hole Number 1A was injected with 170 gallons of AM-9 chemical grout. It was backfillec with 22 gallons of cement grout.

Hole Number 1B was drilled to the right of Hole 1A and left of the spillway wall. Rock slabs were encountered from 10 ft. to 28 ft. 6 inches. Casing was reamed through the rock slabs and the hole continued to a depth of 33 ft. Dye tests were run as the hole advanced to 23 feet, 26 feet, 29 feet and 33 feet, with negative results. A dye test taken at 15 feet showed in 15 minutes.

Running sand was encountered in the bottom which required two small shots of AM-9 to stabilize the hole. The hole was advanced to 34 feet by washing and chopping the AM-9 gels. Pumping tests were carried out and grouting proceeded using AM-9. A total of 340 gallons was placed in this hole. It was subsequently backfilled with 180 gallons of cement grout.

All casings and equipment were removed from the site on August 26, 1969.

The formula for AM-9 was 10% with catalyst and retarder variation to control the set up times from 1½ minutes to 11 minutes. 600 pounds of AM-9 were used. 28# DMAPN catalyst, 40# AP catalyst, 2# red dye tracer, 1# yellow dye tracer.

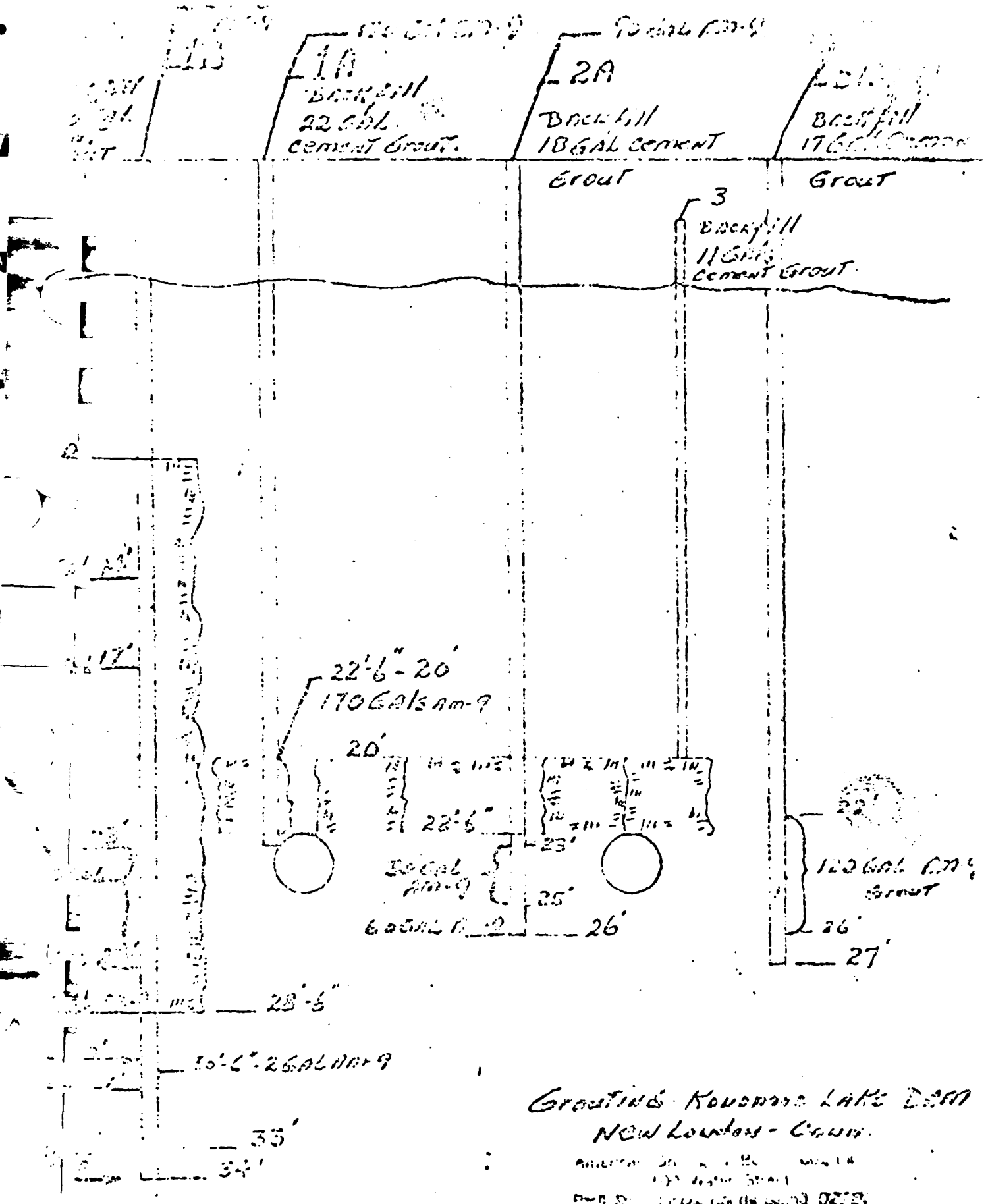
This made up a total of 720 gallons of grout.

The formulat for cement backfill grout was 15 gallons of water, 2 sacks of cement. 10 pounds of Bicarbonate of Soda were used to accelerate the set time for hole number 18. This was mixed at the rate of one pound per sack of cement. It was calculated to give a set-up time of 45 minutes. A test sample indicated initial set taking plac in 35 minutes. A total of 22 sacks of cement were used.

The attached sketch shows the relative location of the four BX cased holes.

Leonard Mark

Leonard Mark



Grouting Kokomo Lake Dam
New London - Conn.

V. SPOFFORD R. THORNDIKE, INC.
ENGINEERS
BOSTON, MASS

November 7, 1969

MEMORANDUM

Subject: Graded Filter Design
Lake Konomoc Dam, Waterford,
Connecticut

Conventional design of graded filters requires that the filter material be graded within certain limits to protect against loss of embankment soil through piping. The fine sands, silty fine sands and fine sandy silts existing in the old dam and the upper strata of the foundation have sufficiently large particle sizes so that they will not pass through the fine filter material. The fill material used in the new dam also contains sufficient coarse material to inhibit piping.

Attached to this memo are the calculations for the filter design and a Grain Size Distribution Chart. This chart shows the gradation of the coarse and fine filter materials and the approximate range of the soils generally found in the existing dam and upper foundation strata. The criteria for design of the filter against migration of fines is that the 15 percent size of the filter be less than five times the 85 percent size of the soil protected. The chart indicates the finest natural soils are within this tolerance and that the fine filter material is within the required tolerance when compared to the coarse filter material.

The design calculations indicate that the filter is adequate to carry the volume of water expected in design. The following paragraphs substantiate the design calculations and assumptions.

The effectiveness of the filter sand to prevent migration of fines into the coarser gravel was demonstrated when, during construction, fine sand and silt particles were washed over the filter during a rainstorm. No evidence of migration of fines was found in the filter sand.

The effectiveness of the filter to carry off the existing seepage was shown by observation after construction of the depth of water in the wick over the boils. The wick was approximately half saturated with water. This indicates that the filter is carrying water at about 25 percent capacity.

In summary, the filter has proven, through both theory and practice, to be capable of carrying the volume of seepage flowing through and under the dam. It also has prevented migration of fines indicating its ability to stop loss of ground through piping.

It is expected that, under the worst possible heads, the filter should function with an adequate factor of safety thus insuring the stability of the dam.

Peter Majeski

Peter Majeski

PM:go'd

RAY SHEFFORD & THORNDIKE, INC
ENGINEERS
BOSTON

PROJECT [illegible] Dam

SUBJECT CHECK OF Graded Filter Design

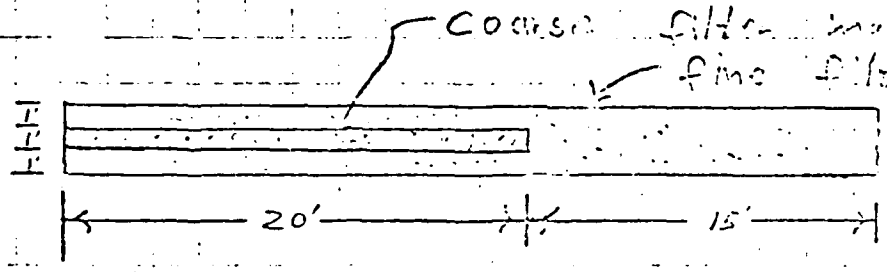
FILE NUMBER VIII-5.1

SHEET NUMBER 1

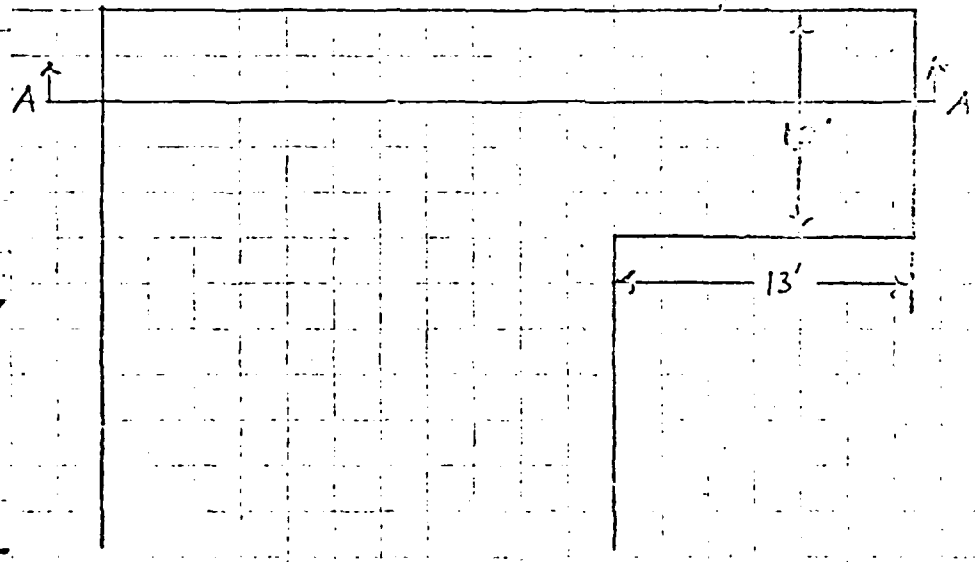
DATE 6 Jan 65

COMPUTED [illegible]

CHECKED BY [illegible]



Section A-A



Plan

FAY SPOFFORD & THORNDIKE, INC
ENGINEERS
BOSTON

PROJECT _____

SUBJECT _____

FILE NUMBER _____
SHEET NUMBER _____
DATE _____
COMPUTED _____
CHECKED BY _____

The amount of flow from the wick along the side of the spillway is estimated to be 2 gal/min. This flow will be through the 10' wide wick and will average 2/10 gal/min/l.f. of wick.

The estimated total flow on one side of the spillway was about 10 gal/min. This flow is assumed to be distributed over a 20' width of filter. The average will thus be 10/20 = ½ gal/min.

Since the above flows were measured when the head was about one half of the maximum expected, the quantities will be doubled for design.

Using Darcy's Formula

$$q = k \frac{\Delta h}{L} A$$

K of fine filter material = 0.4 ft/min
K of coarse filter material = 1.0 ft/min

From Cedergren, "Seepage, Drainage & Flow Nets" Page 191

For wick design

$q_{req'd} = 0.6$ gal/min = 0.08 ft²/min

Assume 3' backpressure at end of wick

L = 15'

Pat Stoffman & Thornburg, Inc.
Engineers
Planners

PROJECT

SUBJECT

FILE
SHEET
DATE
COMPUTED BY
CHECKED BY

$q_{cal.} = 0.4 \frac{3}{15} (3) = 0.24$ ft³/min ✓

$F_s = 2.0$ OK

$q_{req'd.} = 0.08$ ft³/min ✓

For filter design

$q_{req'd.} = 1.0$ gal/min $= 0.13$ ft³/min ✓

$L = 20'$

$\Delta h = 3'$ no back pressure in dam

$A = 3'$

$k =$ 1' of course filter & 2' of fine filter

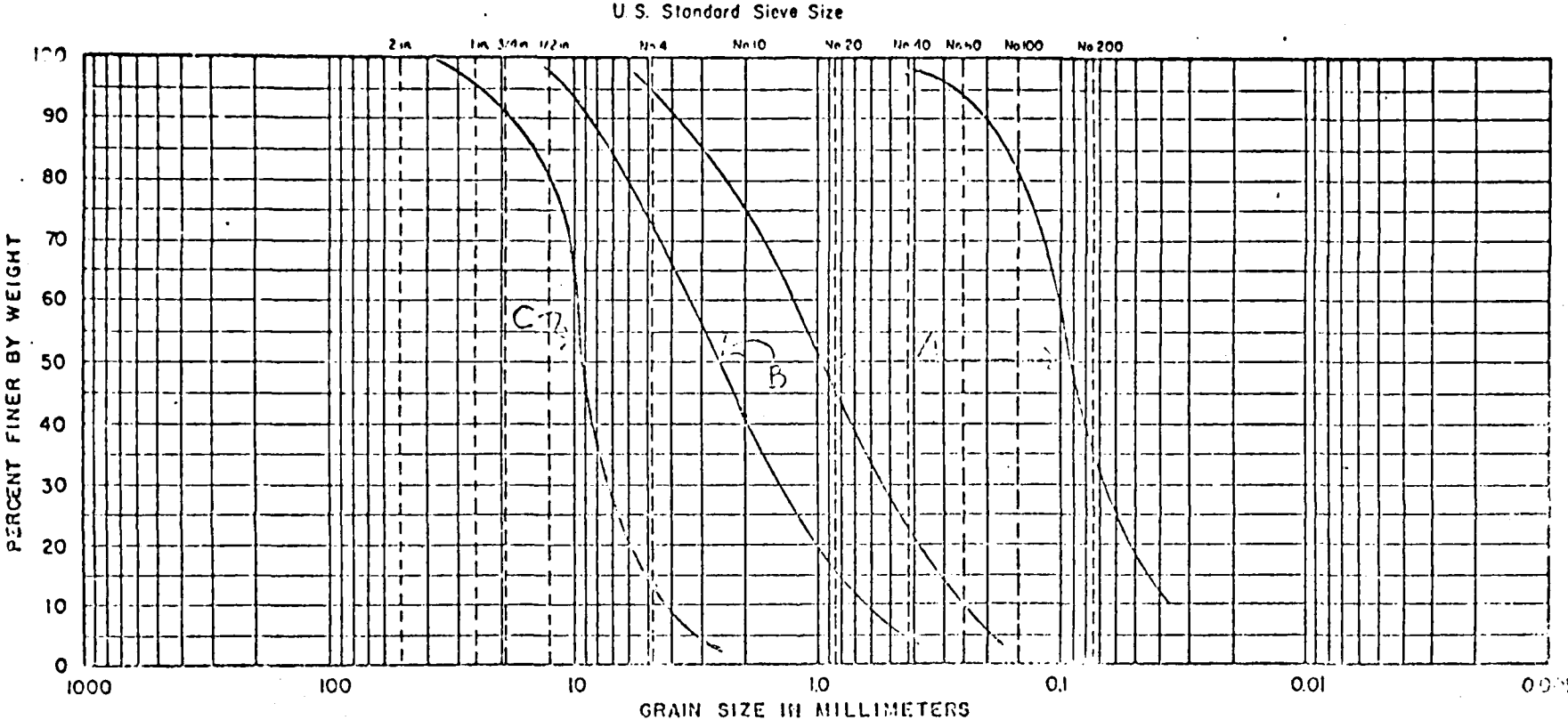
$k_{ave.} = 0.6$ ft/min

$q_{cal} = 0.6 \frac{3}{20} (3) = 0.27$ ft³/min ✓

$F_s = 2.0$ OK

$q_{req'd} = 0.13$ ft³/min

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

A - Approximate range for soils in existing dam and upper foundation strata

B - Fine Filter

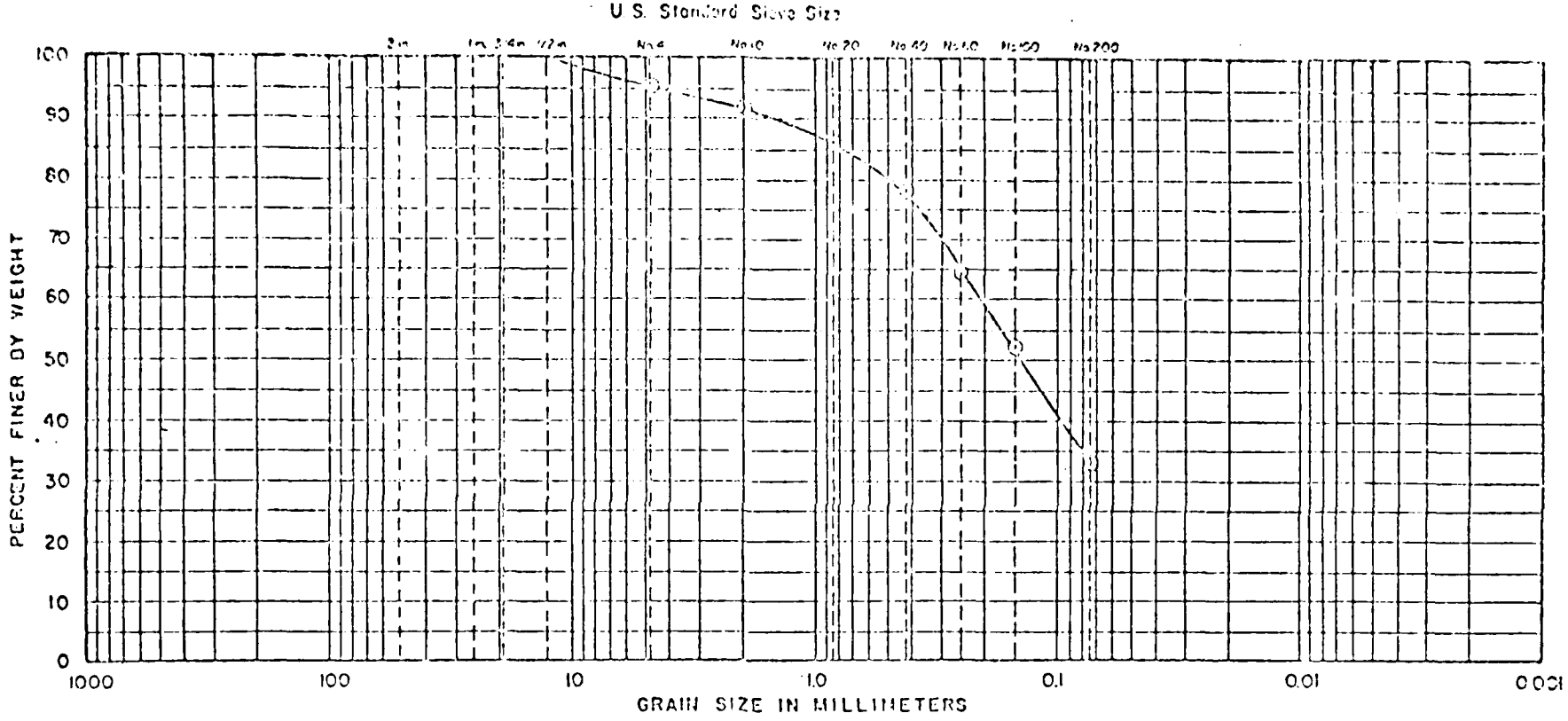
C - Coarse Filter

PROJECT LAKE KONOMOC DAM

Waterford, Connecticut

FILE NO. WN-59 DATE 7 Nov. 1962

GRAIN SIZE DISTRIBUTION



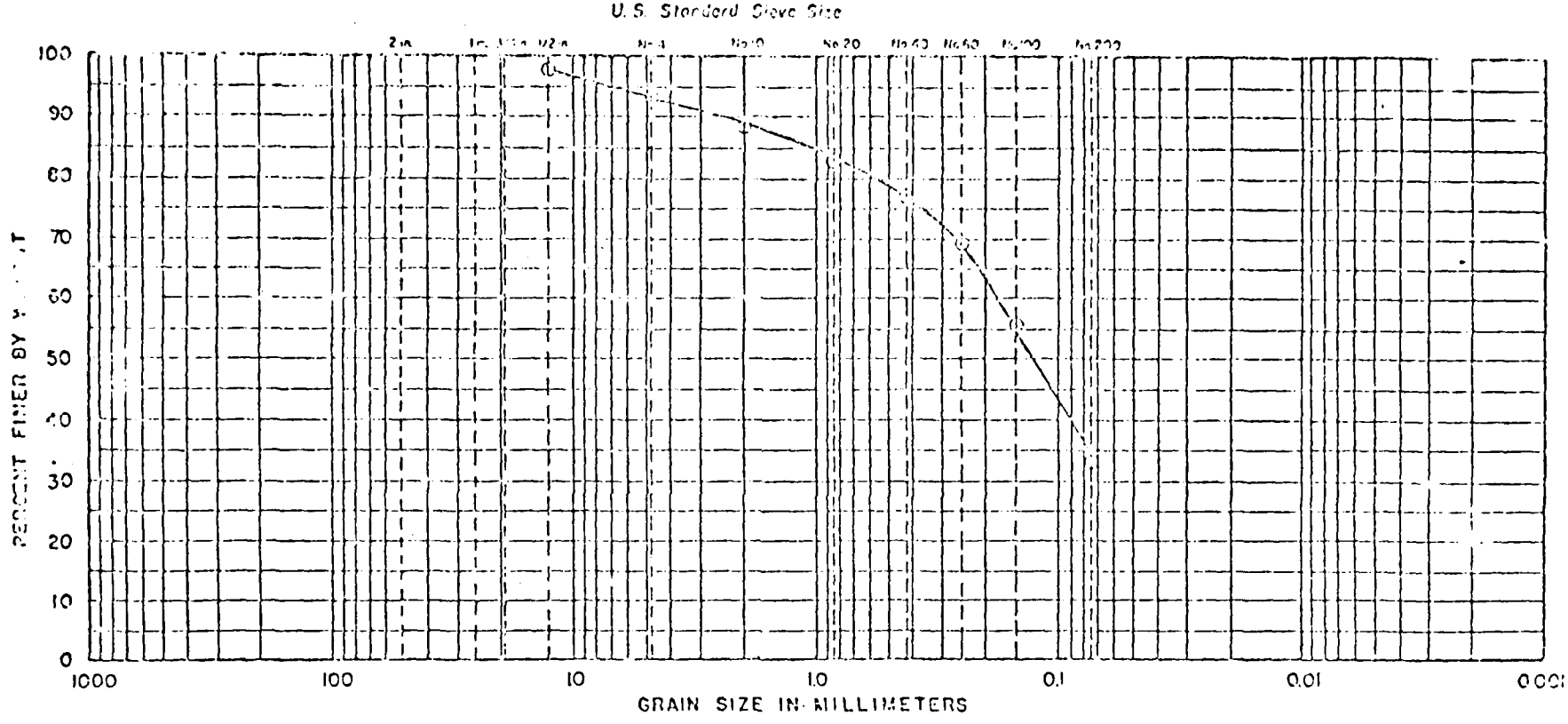
COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

Sample No.	Description
J8	Yellow-brown, silty, medium to fine SAND, trace gravel and coarse sand

PROJECT Earth Dam
New London, Connecticut
FILE NO. 67-1600 DATE 12 Jan. 19[illegible]

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

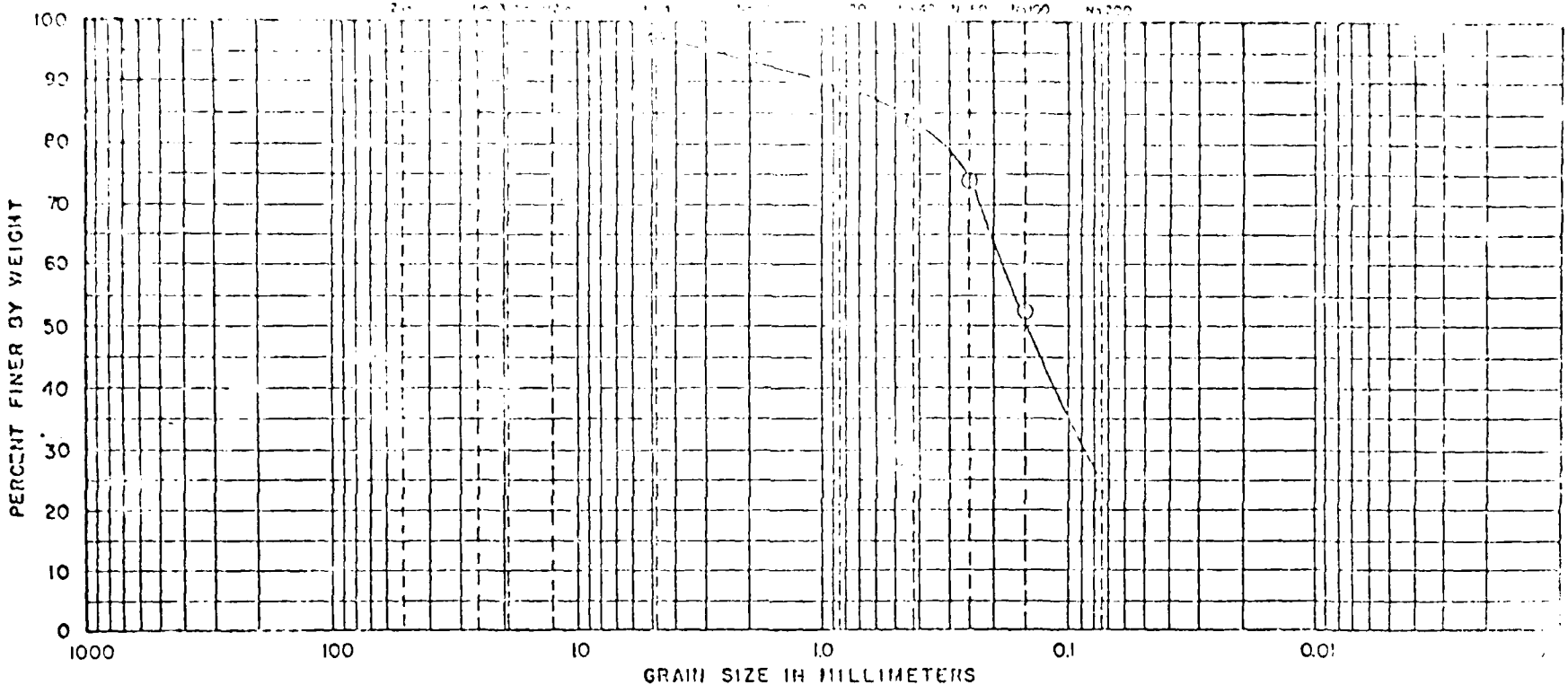
Sample No.	Description
J5	Brown, silty, medium to fine SAND, trace gravel and coarse sand.

PROJECT EARTH DAM

New London, Connecticut

FILE NO. 57-1600 DATE 10 Jan. [illegible]

GRAIN SIZE DISTRIBUTION



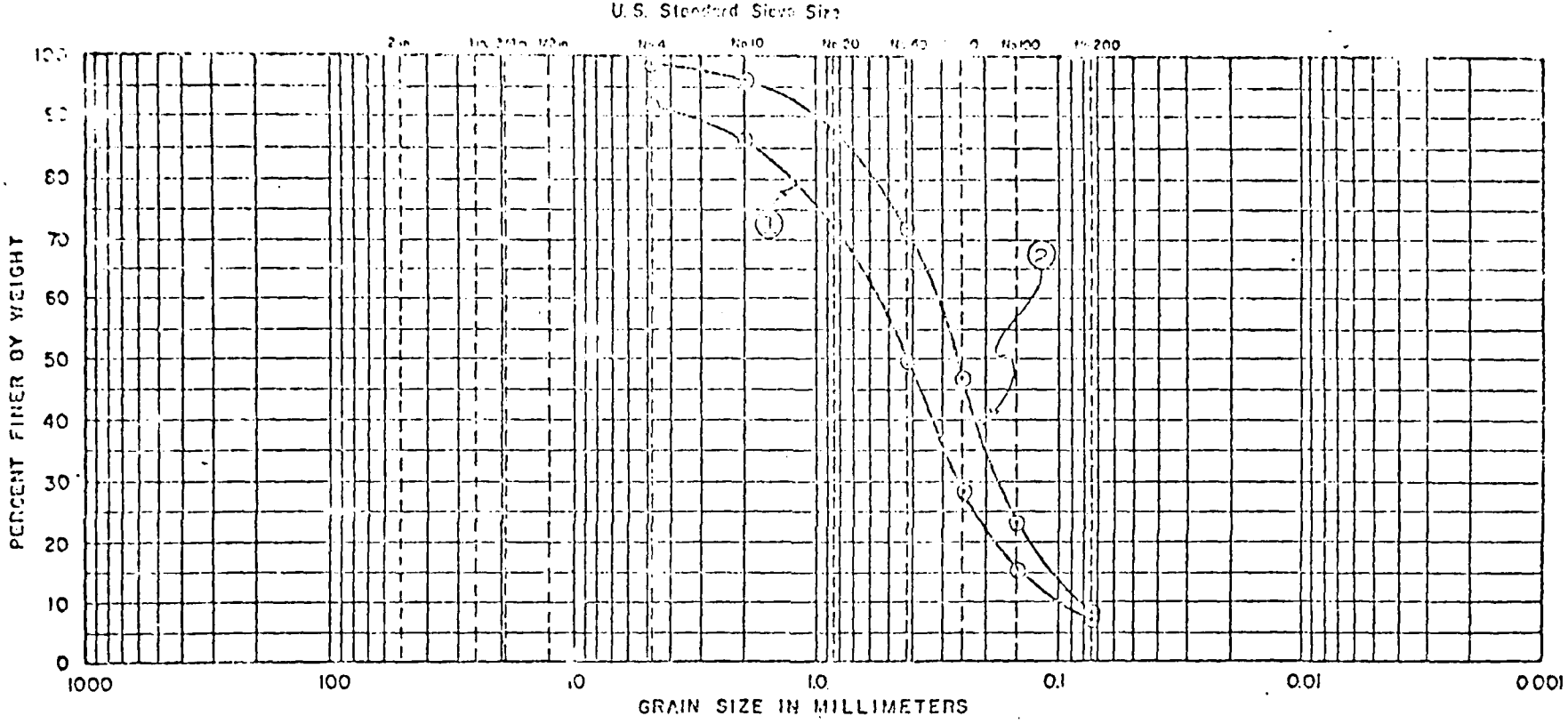
COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

Sample No.	Description
J 4	Yellow-brown, silty, medium to fine SAND, trace gravel and coarse sand.

PROJECT [illegible]
New London, Connecticut
FILE NO 67-1[illegible] DATE 10 [illegible]

GRAIN SIZE DISTRIBUTION



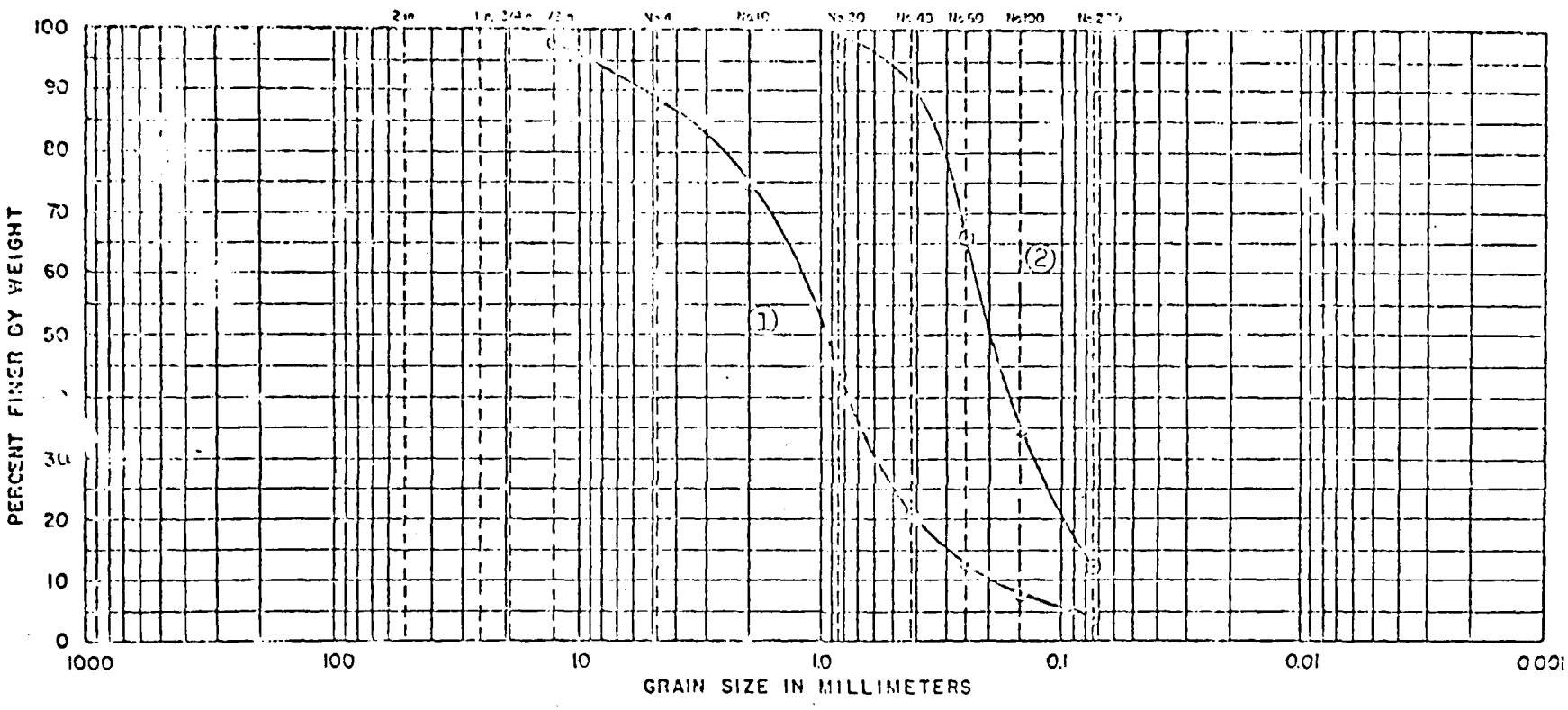
COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

	Sample	Description
①	J3	Yellow, medium to fine SAND, trace silt, coarse sand & fine gravel
②	J6	Yellow, medium to fine SAND, trace silt, coarse sand & fine gravel

PROJECT Earth Dam
New London, Connecticut
FILE NO. 67-1699 DATE 26 Jan. 1967

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

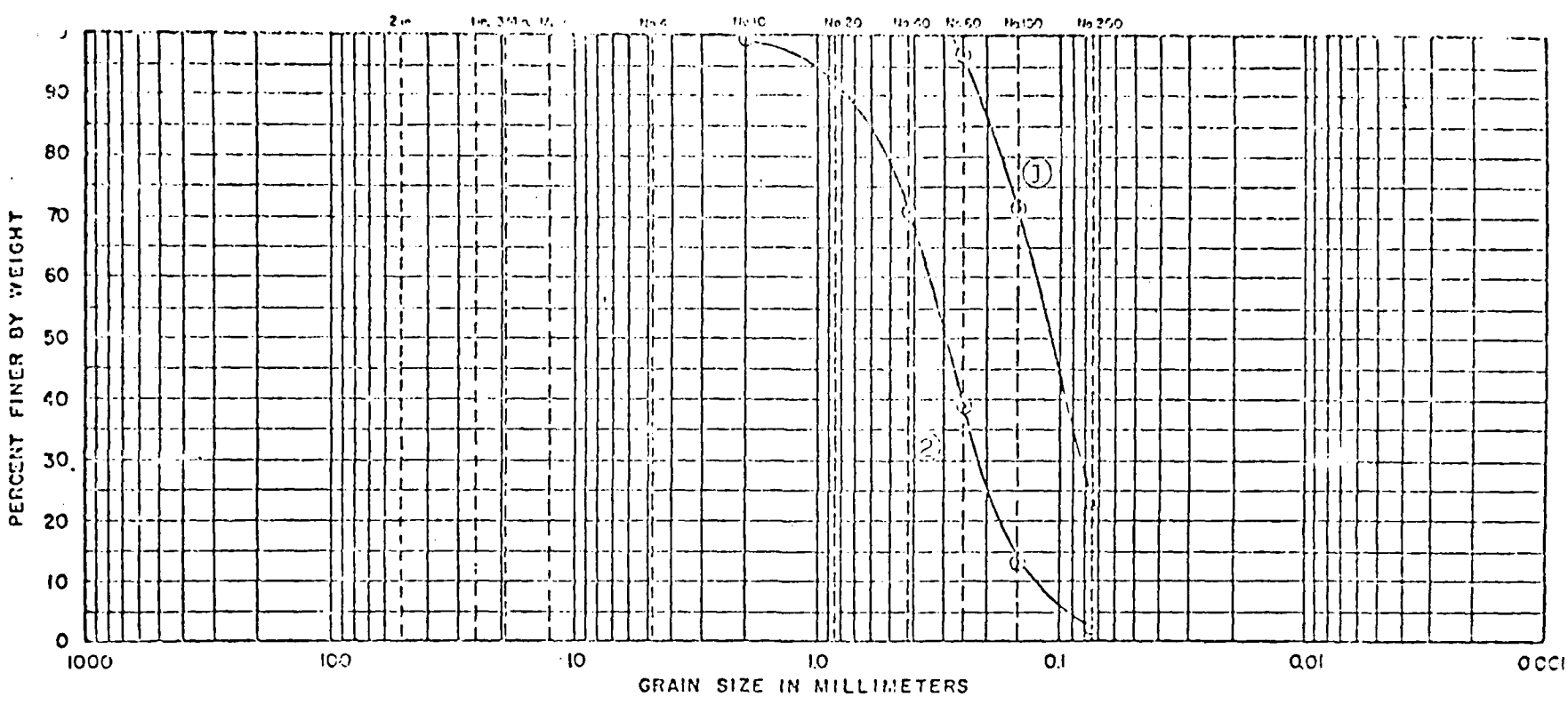
UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

	Boring	Sample	Depth	Description
①	10	8	35-36.5'	Orange-brown, coarse to fine SAND, little fine gravel, trace silt
②	11	8	35-36.5'	Orange-brown, fine SAND, little silt, trace medium sand

PROJECT Konomoc Dam
New London, Connecticut

FILE NO. 67-169 DATE 1 March 1967

GRAIN SIZE DISTRIBUTION

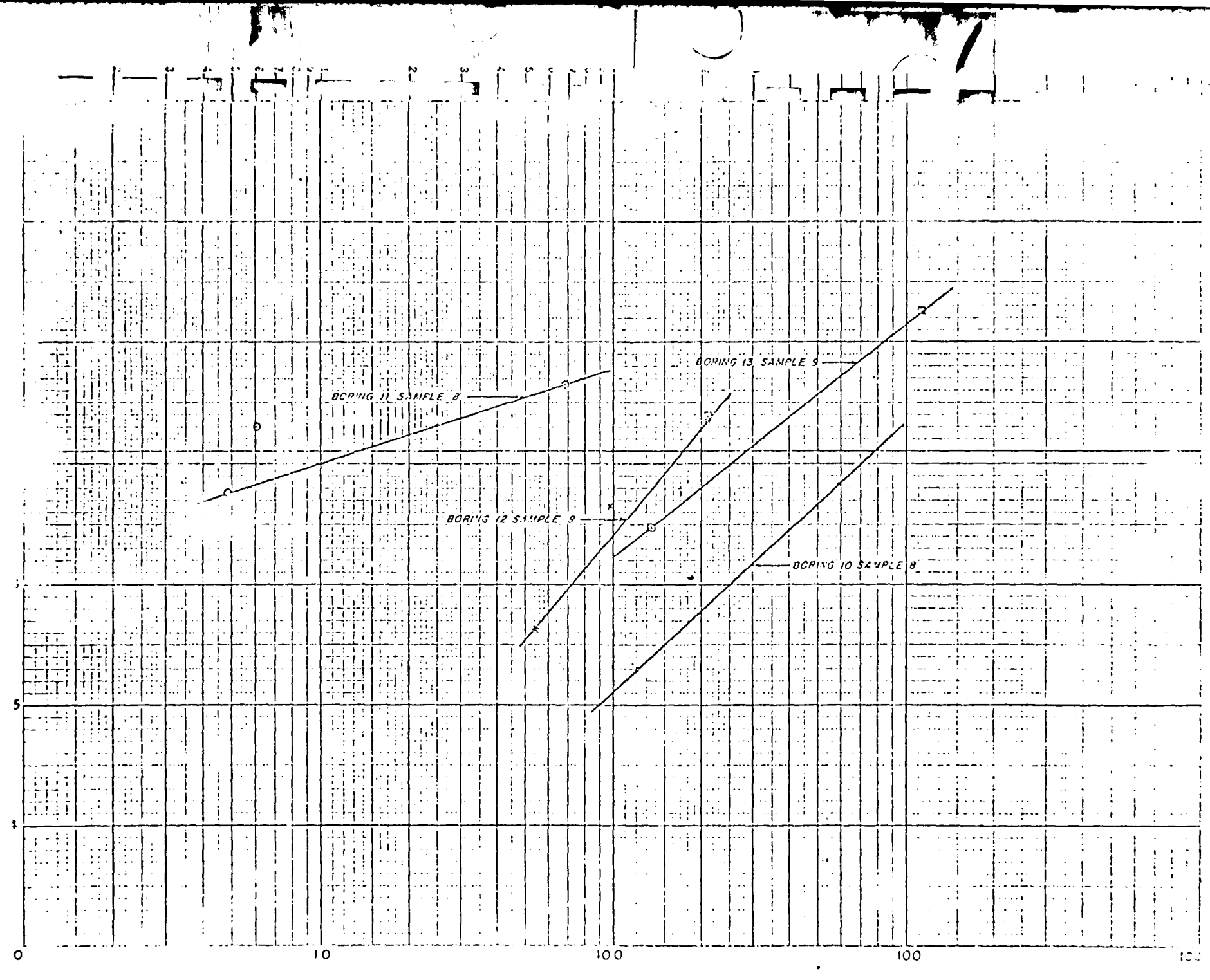


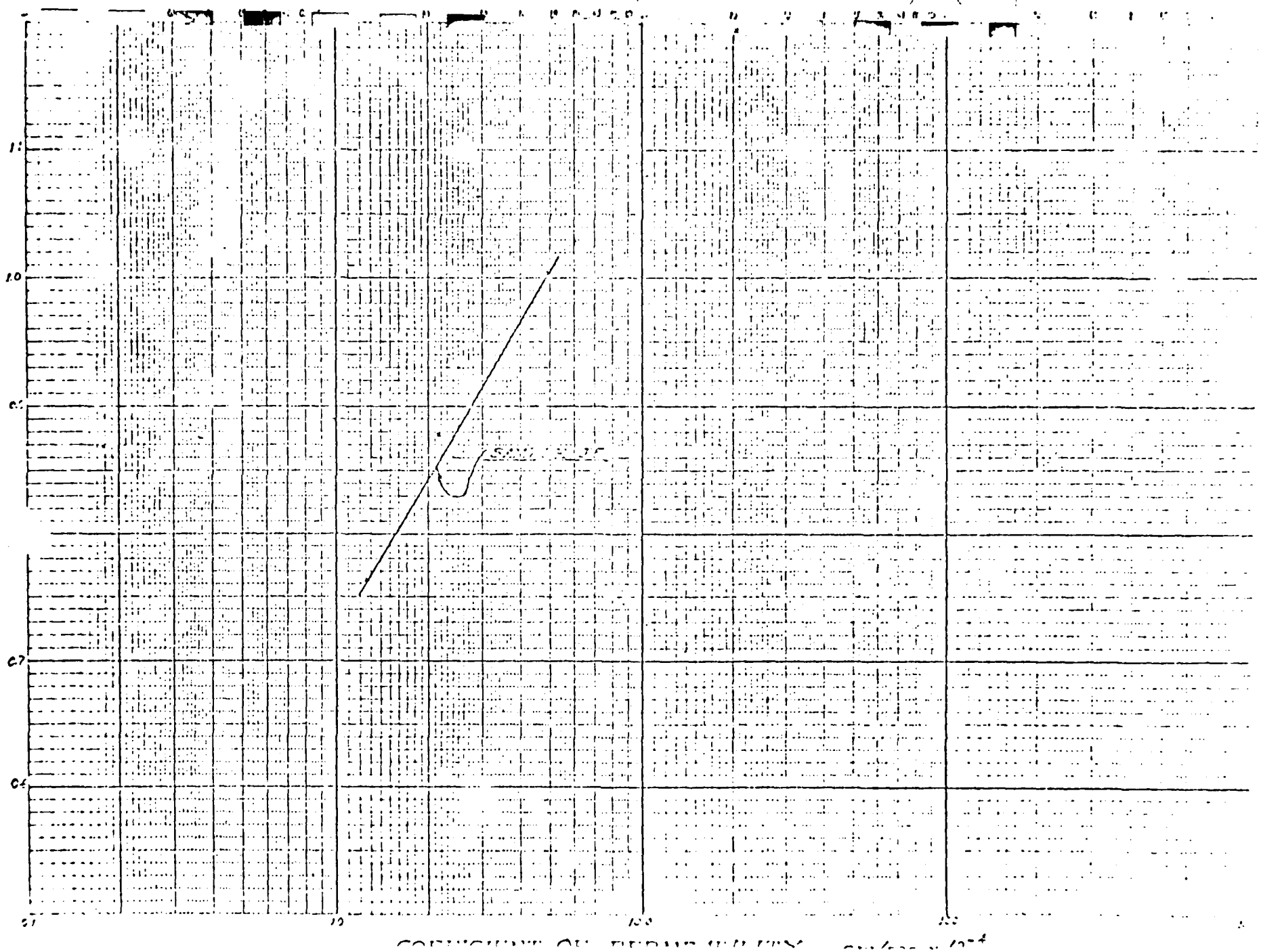
COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

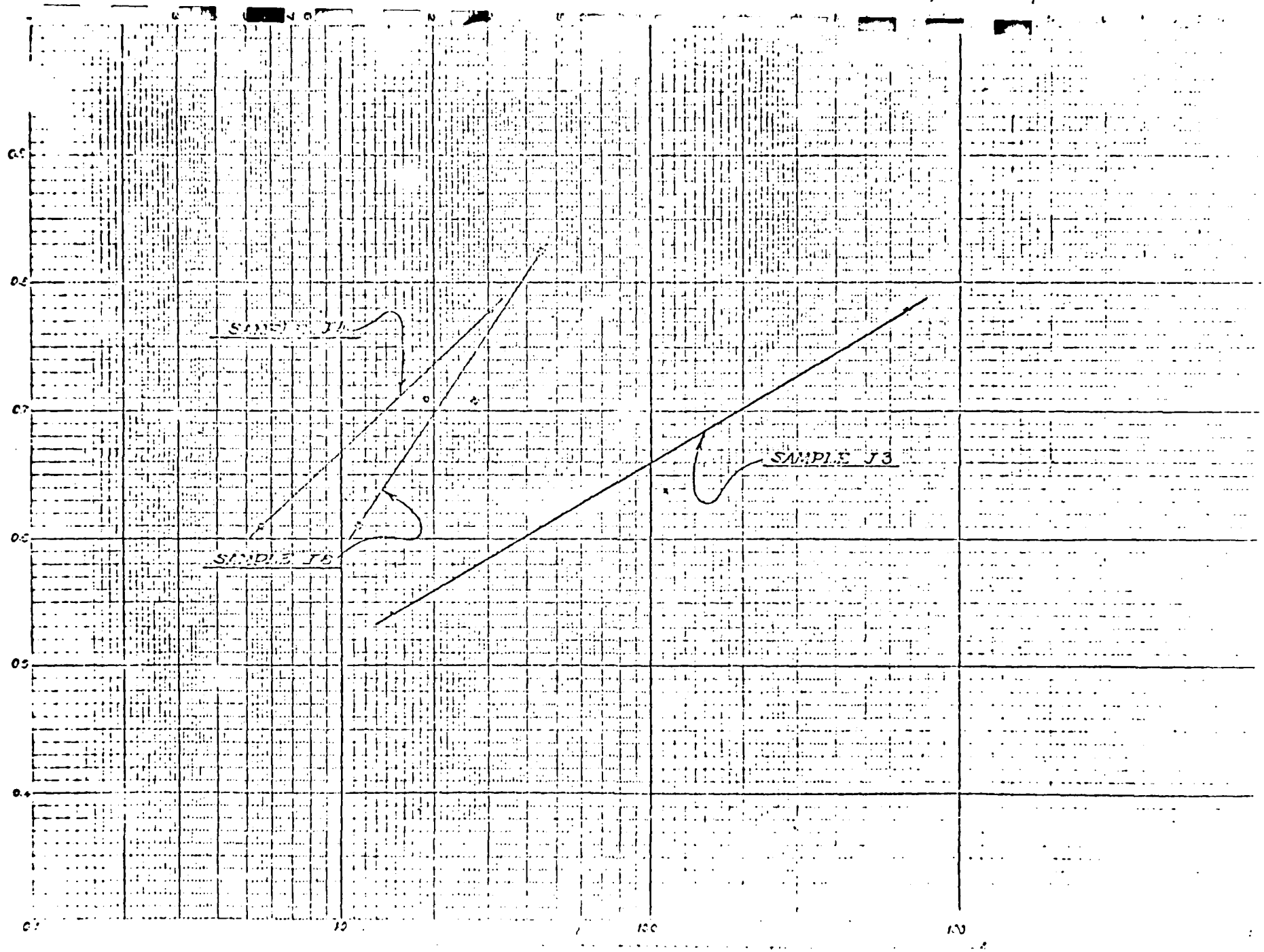
UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY

	Boring	Sample	Depth	Description
①	12	9	40-41.5'	Light gray, silty, fine SAND
②	13	9	40-41.5'	Light gray, medium to fine SAND, trace silt

PROJECT Kenomoc Dam
New London, Connecticut
FILE NO. 67-1699 DATE 1 March 1967


BORING 11 SAMPLE 8
BORING 13 SAMPLE 9
BORING 12 SAMPLE 9
BORING 10 SAMPLE 8
5
1
0
10
100
100




SAMPLE J1
SAMPLE J2
SAMPLE J3

INTERDEPARTMENT MAIL | August 27, 1969

	DEPARTMENT
e	
l' am H. O'Brien III, Civil Engineer	DEPARTMENT Water Resources Commission

Lake Konomoc Dam, Waterford

On August 12, 1969, the undersigned and A. J. Macchi inspected the subject dam and went there with the specific purpose of witnessing the American Drilling & Boring Company, Inc., East Providence, R. I., under Leonard Mark, drive pipes into the embankment and inject AM-9 chemical grout (by American Cyananide) around the pipes through the dam, for the purpose of stopping leakage around same.

The attached sketch shows the location of these driven pipes which met refusal near the tops of the pipes ~~to~~ (about 2 feet above) ~~the tops.~~

There were dye tests made by placing powered dye in the pipes and flushing with many gallons of water. The first notice of dye at the toe was noted some 1½ hours afterwards. Subsequent dye tests were later determined to be inconclusive because times ranging from 5 minutes to several hours were noted. At 4:00 P. M. it was decided that it was too late to go ahead with the grouting operation.

It was decided that the holes should be extended to the required depth by drilling thru ~~the~~ refusal, and grout as originally planned. Bousman & Mark were to keep records of what was done and to notify us when the leaks had been stopped.

In a telephone conversation with Bousman on August 21, it was determined that they had drilled down thru what seemed like boulders or rocks in the same hole at B to 2' below the pipes. The drill at A brought up iron chips and stopped at that point, presumably hitting the 24 inch pipe. The drill hole at C was moved east one foot from the driven hole as shown on sketch, and drilled to a depth of 2' below the pipe. Grout was injected with the maximum setting time of 20 minutes. The leak coming in just east of the 24" pipe where dye was observed as shown in picture #3 taken on August 12, 1969 was stopped, but the leak coming from the west side of this pipe continued.

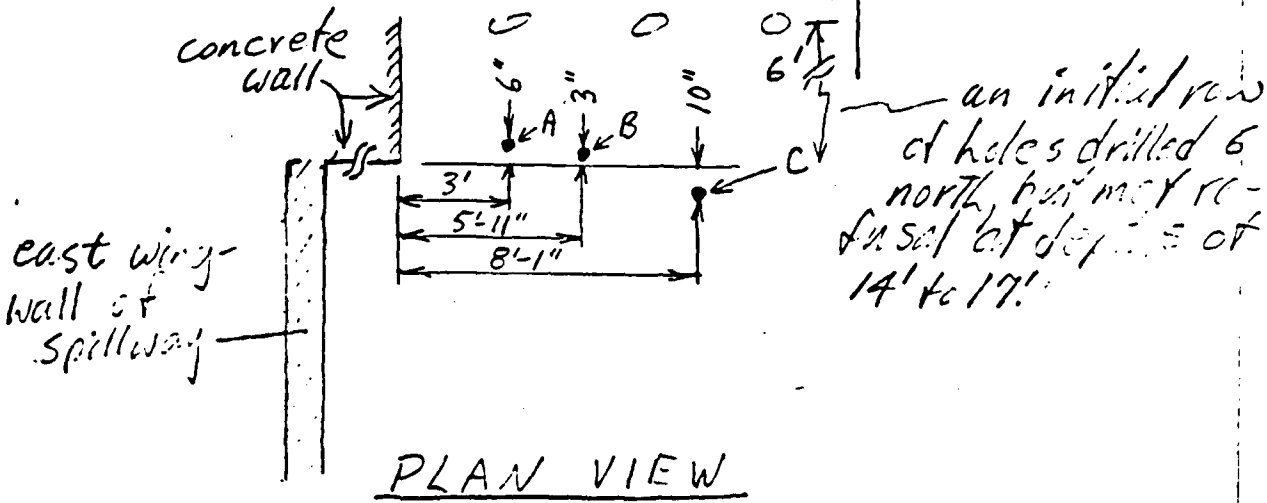
It was then Mr. Macchi's advice (per Bousman) that a hole be drilled adjacent to the east wingwall of the spillway thru the old masonry and grout injected in this area. Bousman is to be in touch with Macchi and this office as the work proceeds

William H. O'Brien III

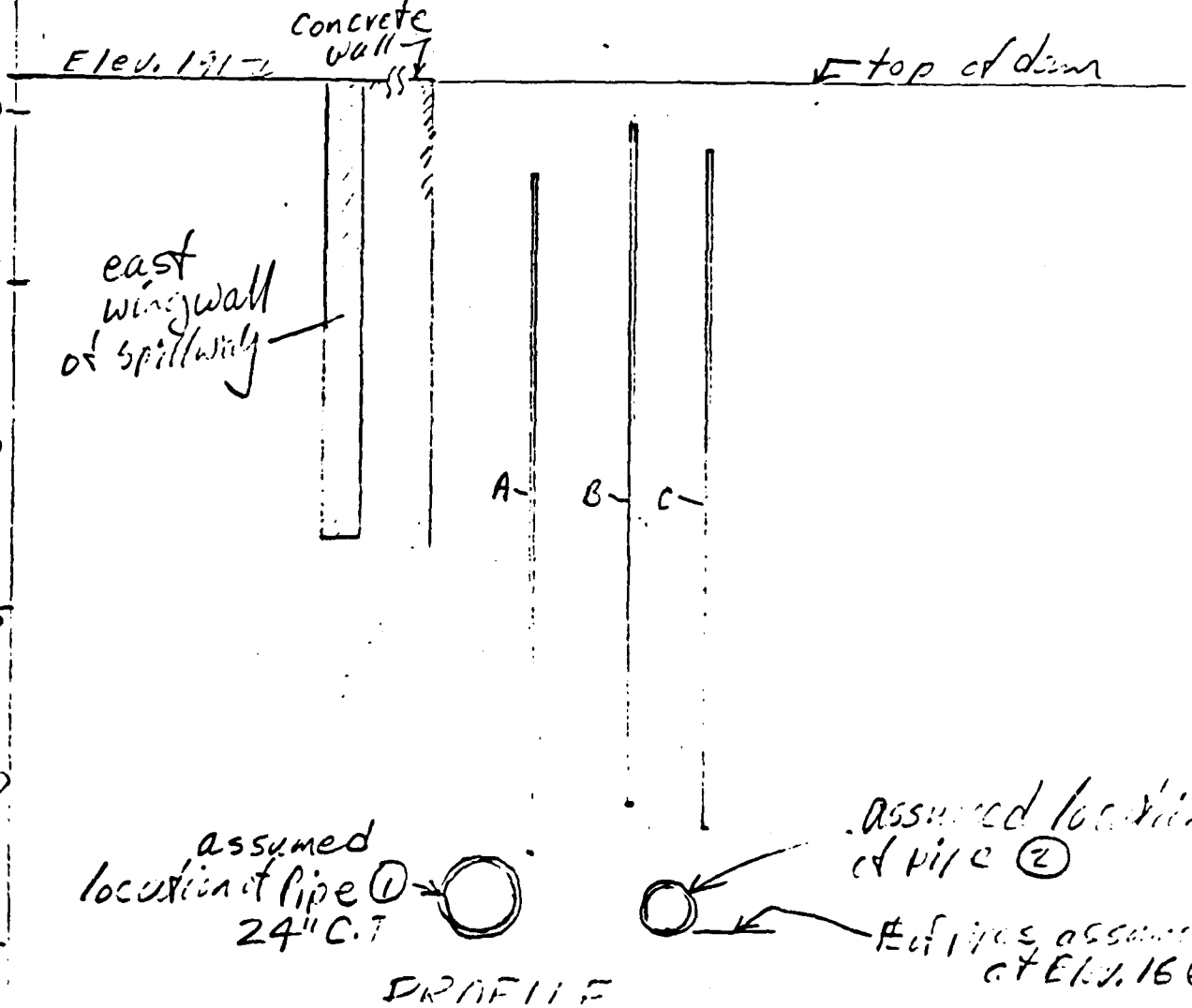
Civil Engineer

Lake Nockamixon Dam, Interlocked

Measurements of locations of 1½" pipes (A, B, & C) driven on 8/12/69



PLAN VIEW



PROFILE

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI
E. R. HOFFMAN
J. SCHMID

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

August 25, 1969

STATE WATER RESOURCES COMMISSION
RECEIVED
AUG 27 1969
ANSWERED
REFERRED
FILED

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention: Mr. William H. O'Brien, III

Re: Konomoc Dam
Waterford, Connecticut

Gentlemen:

On Monday, August 25, 1969, Mr. William O'Brien, Water Resources Commission, State of Connecticut, and I inspected the above project, specifically to check on the situation of grouting in area of pipes buried within the dam east of the spillway. John Bousman arrived later.

The contractor was filling furthest west of four holes with cement grout. Grout mix was accelerated by using one pound of sodium carbonate for each bag of cement.

Contractor said he used about 720 pounds of AM12 jell in four holes. This amounts to about 100 cubic feet of material.

The contractor had poured about five batches of grout into the fourth hole (about four cubic feet each) and still the hole depth remained about the same.

The contractor was instructed to imbed a pizometer tube approximately 2"-2½" in diameter for further reference, before rebuilding the filter.

John Bousman was previously instructed that the excavated area be cleared of all fines which washed into this excavation.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

J. MACCHI
R. HOFFMAN
J. SCHMID

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

August 20, 1969

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention: Mr. William H. O'Brien, III

Re: Konomoc Dam
Waterford, Connecticut

Gentlemen:

Inspected the site on Tuesday, August 19, 1969, specifically to check on progress and results of AM-9 chemical grouting being done to construct a cut-off collar around two 24" cast iron pipes which remain just east of spillway.

Three pipes were jetted, driven and cored (one on each side and one in the middle of the pipes) approximately opposite top of spillway. Pipe furthest west encountered one of the pipes; the other two were extended to 2' below estimated pipe elevation.

Chemical grouting was applied to all three pipes.

The seepage reduced slightly at East edge of the excavation, but for the most part there was no noticeable reduction in seepage.

After some review and discussion with John Bousman, it was decided to put down another hole, closer to the spillway, extended down to approximately 30'. Dye would then be introduced to see if it shows up in the seepage. Chemical grout would then be introduced in an attempt to reduce seepage.

Very truly yours,
MACCHI & HOFFMAN ENGINEERS

A. F. Macchi

August 27, 1969

Fay, Spofford & Thorndike, Engineers
c/o Mr. C. S. Mansfield
11 Beacon Street
Boston, Massachusetts

Re: Lake Konomoc Dam
Waterford

Dear Mr. Mansfield:

Your resident engineer, John Bousman has been quite helpful in providing us with construction drawings marked with colored pencil to indicate as-built conditions. To bring the information in our file up to date, we request the following information at your earliest convenience:

1. Scale drawings of all pipes thru the dam indicating size, type, and location of plan and profile as requested in our letter of June 10, 1969.

2. Soils data on existing embankment and filter design.

3. Working drawings and specifications for proposed weir construction (reference your letter of July 25, 1969) and an explanation of how it should be monitored to insure that the filter is functioning properly.

4. A more detailed explanation of what type of periodic inspection you intend to provide and over what period of time.

We request this information at your earliest convenience. In the meantime we are in contact with your field office and are attempting to seal off the leakage around the pipes by injection of a chemical grout.

Very truly yours,

William E. O'Brien III
Civil Engineer

WEO:Jad

cc: John Bousman
A. J. Maccini
Charles P. diBiasi

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI
J. P. HOFFMAN
A. J. CHMID

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

August 13, 1969

STATE WATER RESOURCES COMMISSION
RECEIVED
AUG 1 1969

ANSWERED
REFERRED
FILED

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Re: Konomoc Dam
Waterford, Conn.

Gentlemen:

A meeting was held at the above-referenced project for the specific purpose of witnessing the grouting to form a collar around two 24" cast iron pipes left in place just east of the spillway.

Present were the following:

Grouting crew of two men plus Superintendent Leonard Mark
John Bousman, Resident Engineer for Fay, Spofford & Thorndike
Wm. O'Brien, Water Resources Commission
A. J. Macchi, Consultant to the State

Three pipes were inserted into the dam by jetting and pounding, locating one on each side and one in the middle. Unfortunately, refusal was encountered about 2' above the estimated location of the pipes. Dye was inserted into these pipes and timed until it showed up at toe leaks. Time varied from a few minutes in one case to two hours in another.

An attempt was made to chemically grout the holes, however, it was unsuccessful due to some difficulty in the mixing process.

It was agreed that these holes would be grouted tomorrow, August 13, 1969, and then another rig would be brought in to drill through the refusal down to 2' below the piping and chemically grouted to achieve the desired cut-off collar.

Water Resources Commission
State of Connecticut
Hartford, Connecticut

August 13, 1969

A check made on development along the run-off stream indicates there are at least thirty homes along this stream before it flows into Niantic Bay.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

cc.

STO 701

INTERDEPARTMENT MAIL

DATE: August 13, 1969

e | DEPARTMENT

l: m H. O'Brien III, Civil Engineer | DEPARTMENT: Water Resources Commission

e Konomoc Dam, Waterford

On August 7, 1969 the undersigned inspected the subject dam site with our consultant John Macchi, and John Bousman, resident engineer.

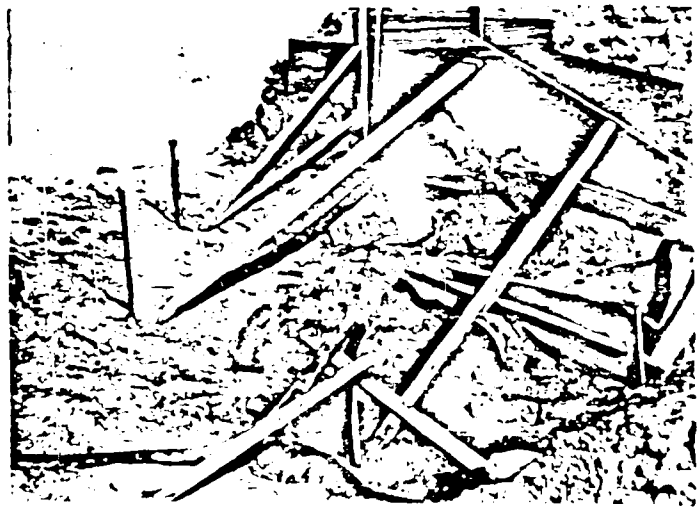
The ends of 2 pipes had been exposed at the toe of the dam just east of the spillway wingwall. The westerly one (next to the spillway wingwall) had a valve enclosure on it (shown in picture # 1.) It was coming thru a masonry wall. Water was observed flowing from beneath the pipe and a boil was noted in the vicinity of the ruler shown on Picture # 2.

Mr. Macchi felt that the rate of flow, estimated at 1 to 2 gal/min was too much to allow even with the downstream filter. It was therefore decided to proceed with the injection of a grouting substance around these pipes by drilling down from the top of the dam. Bousman will advise us as soon as this operation is ready to go.

W. H. O'Brien III

Civil Engineer

HO:jad



MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI
R. HOFFMAN
J. SCHMID

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

August 8, 1969

STATE WATER RESOURCES COMMISSION
RECEIVED
AUG 11 1969
ANSWERED
REFERRED
FILED

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Re: Konomoc Dam
Waterford, Conn.

Gentlemen:

On Thursday, August 7, 1969 I met with William O'Brien of the Water Resources Commission and John Bousman of Fay, Spofford & Thorndike at the above-referenced project specifically to inspect boiling conditions at the east side of the spillway. As requested, the contractor excavated the toe of the dam back to the end of the cast iron pipes which are plugged and buried within the dam.

Water was seeping at a steady rate in this general area. My personal estimate is about 1½ to 2 gallons per minute flow.

I personally took three pictures and Mr. O'Brien took two.

John Bousman has made arrangements with American Well Co. of Providence for chemical grouting (using M-9 Am. Cyanimide) around these pipes. It is tentatively planned to start this work next Monday. Prior to starting the grouting, dye will be used in an attempt to determine the channeling location.

I plan to visit the project again Monday to witness the grouting operation.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

August 8, 1969

Fay Spofford & Thorndike, Engineers
c/o Mr. C. S. Mansfield
11 Beacon Street
Boston, Massachusetts

Subject: Lake Konomoc Dam
Waterford

Gentlemen:

We are in general agreement with your understanding of our meeting as itemized in your letter of August 4, 1969.

However we would like to make the following comments on your numbered items.

3. "pipe" should read "pipes"

5. We do not agree that "regardless of effectiveness, the observation hole will be properly backfilled upon completion of grouting". In general, we feel that this water seepage should be stopped altogether or diminished to an insignificant amount, and that if this is not accomplished by grouting, a discussion should be held to determine the best means of proceeding.

Very truly yours,

William H. O'Brien III
Civil Engineer

WHO:jcd

cc: Mr. DeBiasi
John Macchi

INTERDEPARTMENT MAIL

DATE: August 7, 1969

e

DEPARTMENT

1 am H. O'Brien III, Civil Engineer

CT

DEPARTMENT: Water Resources Commission

e Konomoc Dam, Waterford

On July 31, 1969, a field meeting was held at the subject dam with the following present: John Macchi, States Consultant; William H. O'Brien, W. R. C.; John Bousman, resident engineer; Peter Mazeski and C. S. Mansfield, all of Fay Spofford and Thorndike, design engineers.

A Plan which had been marked in various colored pencils and reflecting field findings and as-build revisions were given to John Macchi and myself.

A general discussion was held concerning the boils which were noted near the toe of the existing embankment. John Bousman said he had seen some water flowing around the case iron pipes at the point where they were exposed at the downstream toe at the gate valves. They were exposed at this point in order to pump concrete thru them into the gate house which is now filled with concrete.

The design engineer's soils engineer, Peter Majeski, felt that the extension of the sand filter blanket upstream and placed over these boils would effectively intercept this percolating water. Our consultant, John Macchi felt that the filter should not be relied on to accomplish this especially since at least some of the flow was from around the pipe. It was felt that if fines from the dam were carried in this flow they could either pass downstream unnoticed or else clog the filter allowing undesireable pressures to build up in the downstream slope.

It was therefore agreed that a collar be formed around these pipes as close to the core wall as possible by the injection of concrete or a chemical gell from pipes driven down from the top of the dam. This collar is to extend at least 2' out from the pipes in all directions. An observation well is to be constructed around the ends of these pipes and a visual inspection to be made by Mr. Macchi before and 24 hours after the grouting operation to insure that the leakage around the pipes has been arrested.

William H. O'Brien

Civil Engineer

WHO:jad

t A. OWMAN
I M AHALY
BOLL A. FARWELL
PH W. HORNE
LIAI .. MYLAND
OLI 1. JONES
MRD C. KEANE
NK L. LINCOLN
FAR J. WILLIAMS

FAY, SPOFFORD & THORNDIKE
ENGINEERS
11 BEACON STREET • BOSTON, MASSACHUSETTS 02108
AREA CODE 617 • 523-8300

BRIDGES AND OTHER STRUCTURES
WATER SUPPLY AND SEWERAGE
PORT AND TERMINAL WORKS
INDUSTRIAL BUILDINGS
EXPRESS HIGHWAYS
AIRPORTS

VALUATIONS
INVESTIGATIONS, DESIGNS
SERVICES DURING CONSTRUCTION

August 4, 1969

State of Connecticut
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

STATE WATER RESOURCES COMMISSION
RECEIVED
1969
ANSWERED
ACKNOWLEDGED
FILED

Attention Mr. William H. O'Brien III, Civil Engineer

Subject: Lake Konomoc Dam
Waterford, Connecticut

Gentlemen:

This letter is written to state our understanding of extra work at Konomoc Dam required by your office. The extra work will provide for installation of a grout collar around the existing gravity water mains which extend from the abandoned gate house.

It was generally agreed that the work will include the following:

1. Excavate an observation hole at the end of the existing gravity pipe. (Provisions will be made for an inspection by Mr. Macchi about 24 hours prior to grouting.)

2. Installation of grout placement pipe as close as possible to the abandoned gate house.

3. Place grout collar. (It is planned to place a two foot collar around the existing gravity pipe.)

4. The results of grouting will be observed by Mr. Macchi.

5. Regardless of effectiveness, the observation hole will be properly backfilled upon completion of grouting.

We anticipate that this work will be completed during the week of August 4, 1969.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By C.S. Mansfield

CSMansfield:rcl
WN-59(3)
cc: A. J. Macchi, Engineers
Mr. Charles P. deBiasi
Mr. J. H. Bousman

MACCHI & HOFFMAN • ENGINEERS

EC ITIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

J. MACCHI
R. OFFMAN
L E HMID

IOCIATE CONSULTANT
OF C. W. DUNHAM

July 28, 1969

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

STATE WATER RESOURCES COMMISSION
RECEIVED
JUL 29 1969
FILED
ANSWERED
REFERRED
FILED

Attention Mr. William H. O'Brien III

Re: Lake Konomoc Dam
Waterford, Conn.
Problem with Boils at Toe
Around Spillway

On July 25, 1969 I received a call from Mr. Majeski of Fay, Spofford & Thorndike regarding work being done to take care of boil problem. He had not as yet received the July 24th letter from the State. This, I read to him. He said he had a letter ready to mail which was not sent out because Mr. Mansfield was not in the office. He said the letter would be sent out as soon as possible.

He stated that in excavating for increased filter drain they discovered that most of the seepage was coming from around buried pipes within the dam. The pipes have been grouted inside. In reviewing the plans, which are not too clear, it appears it is the intent to leave a system of pipes buried within the dam. This has not been noted by me before.

Mr. Majeski stated that it would have been impossible to remove these pipes and that he expected the extended filter system to effectively collect seepage and cope with the problem.

I made it very clear that we wanted to know more about the pipe system to be left in the dam and how they are grouted. Further, that some steps would have to be made to effectively stop the piping around these pipes. We had a long discussion as to why this is necessary to assure against a future failure.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

FAY, SPOFFORD & THORNDIKE
ENGINEERS
11 BEACON STREET • BOSTON, MASSACHUSETTS 02108
AREA CODE 617 • 523-8300

July 25, 1969

State of Connecticut
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Attention: Mr. William H. O'Brien, III

Subject: Boils at Lake Konomoc Dam
Waterford, Connecticut

Gentlemen:

We have completed our investigation of the cause and control of the boils adjacent to the spillway at Lake Konomoc Dam. It has been determined that the cause of the boils on the east side of the spillway is the seepage of water along the outside of grout-filled cast iron pipes, shown on the plans, which existed in the original dam. Much of this cast iron piping has been removed, leaving about 40 feet remaining between the toe of the old dam and the gatehouse at approximately Elevation 166. In addition, the grouting has been found to be effective in plugging the pipe.

These cast iron pipes are not the same pipes referred to in Mr. Macchi's letter of 13 June, 1969. The pipe he referred to was a steel pipe which penetrated through the Contractor's cofferdam to within 25' to 30' of the centerline of the dam core wall. An attempt was made to remove at least part of the steel pipe during the week of 29 June, 1969, but it could not be located. Since the steel pipe through the cofferdam is probably not affecting the boiling significantly, further attempts to locate it were curtailed.

A number of alternates were investigated to control the boiling and to prevent further piping. These alternates included various types of cutoffs under the dam and graded filters near and downstream of the toe. The graded filter scheme has been selected. It is the one most often used for control of boiling, having proven to be both effective and economical.

After completion of the dam, we intend to grout either with chemicals or cement in the area of the cast iron pipes in order to seal any piping channels.

The purpose of the filters is to relieve pressure in the dam by forcing seepage to occur where it can be controlled. Placing the filter over the boils increases the pressure locally along the piping channel. This increase in pressure will be well under the dam away from the toe where the possibility of sloughing is greatest. Also, the velocity of the flow in the channels is decreased, thus lessening the possibility of the seeping water carrying soil particles. Even if soil is carried in these channels, the fine filter will stop the particles from passing out of the dam.

An impervious blanket has been placed upstream of the core wall to cut down on the additional seepage at full reservoir when the water will cover this area.

As a precautionary measure, and to judge the necessity of additional chemical grouting, we will construct a weir to measure the rate of seepage and will provide periodic inspection of the dam. Any increase in the rate of seepage without a corresponding increase in head will be an indication of possible worsening of the piping. Also, the visual inspection of the dam itself will indicate if seepage, which may cause sloughing, is reaching the surface.

The filters have been constructed and it is estimated that, at the present time, they are functioning properly at less than 30 per cent of their capacity. With full reservoir, the head will about double so that the filters will function at less than 60 per cent of total capacity.

We believe that the graded filter scheme is the proper solution to control the seepage at the present time. However, continuing measurements of seepage will be made and additional corrective measures will be taken, if necessary. We would appreciate your comments on our decisions and refer you to the enclosed sketches for additional information.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By
T. S. Mansfield
by R. W. Horne
Ralph W. Horne

RWH:go'd
Encls.
WN-59 (3)

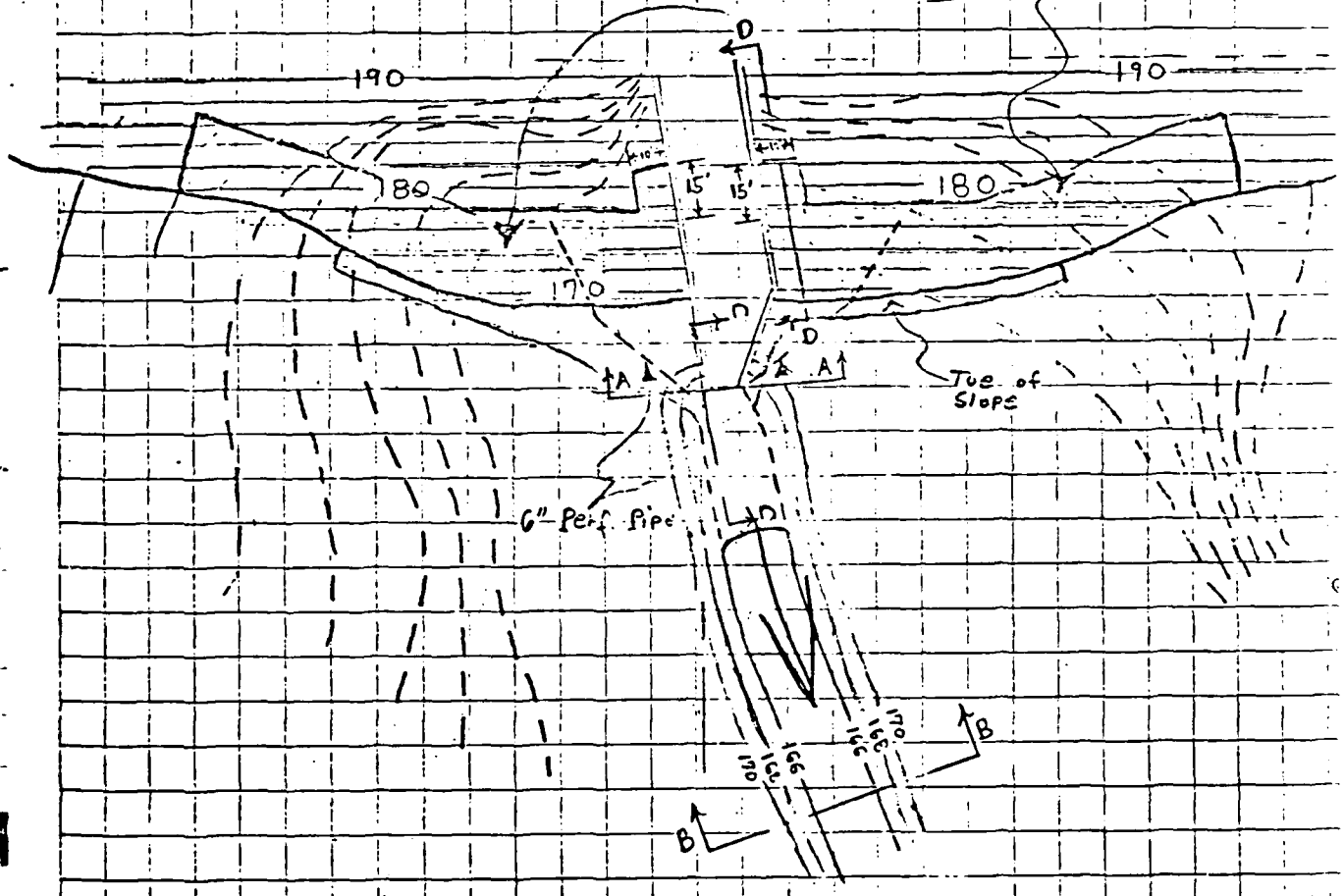
FAY, SPOFFORD & THORNDIKE, INC
ENGINEERS
BOSTON

PROJECT Kohoutek Dam

FILE NUMBER WN-59(?)
SHEET NUMBER 1
DATE 2 July 1969
COMPUTED BY P. J. Mu[illegible]
CHECKED BY

SUBJECT Control of Boils & Piping
Downstream of Dam

Minimum 2' thick impervious blanket placed upstream of core wall. Blanket is 85± wide.



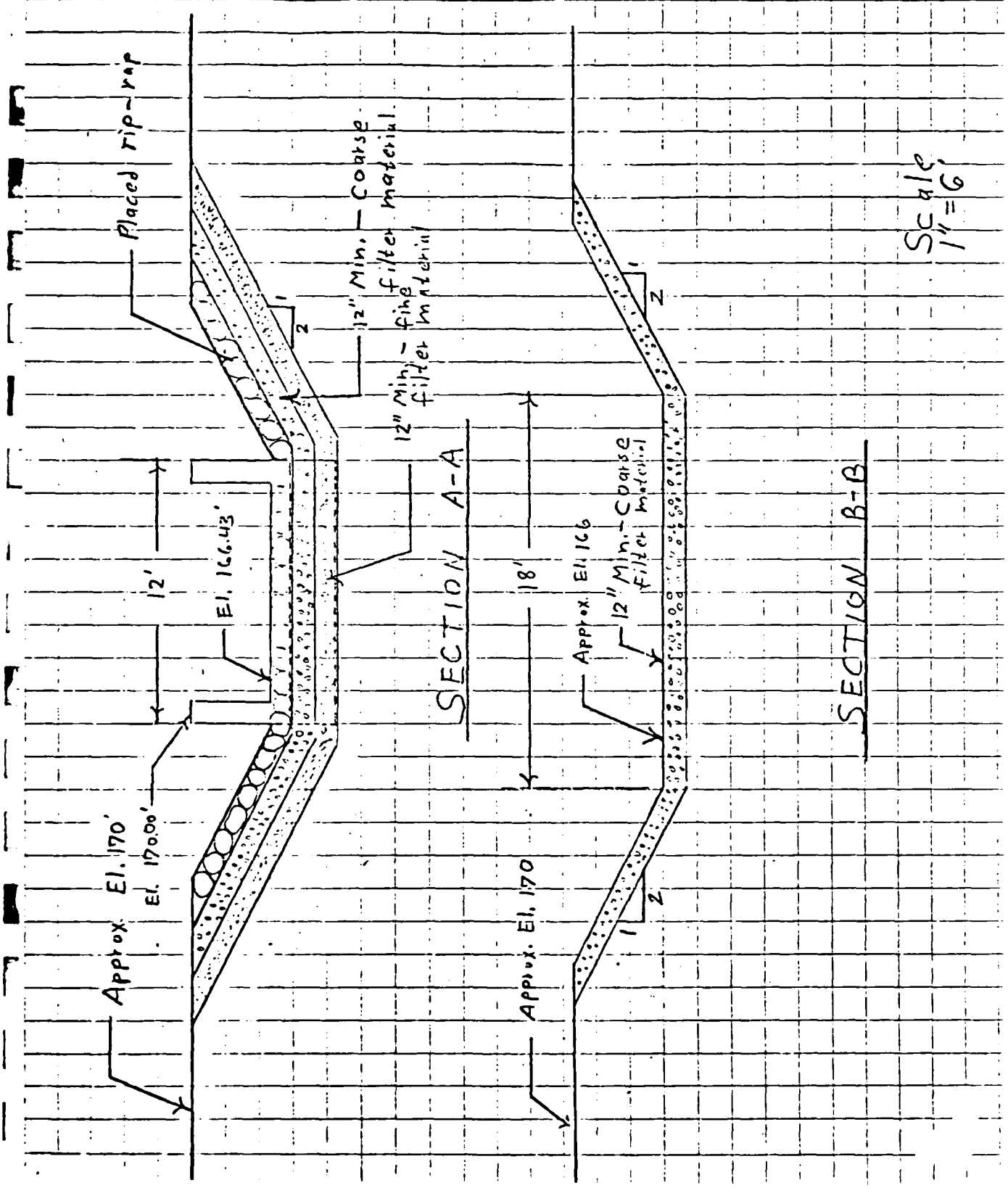
Scale
1" = 50'

FAY SPOFFORD & THORNDIKE INC
ENGINEERS
BOSTON

PROJECT Konomac Dam

FILE NUMBER WN-59(3)
SHEET NUMBER 2
DATE 2 July 1969
COMPUTED BY P J Mayer
CHECKED BY

SUBJECT Control of Boils & Piping
Downstream of Dam

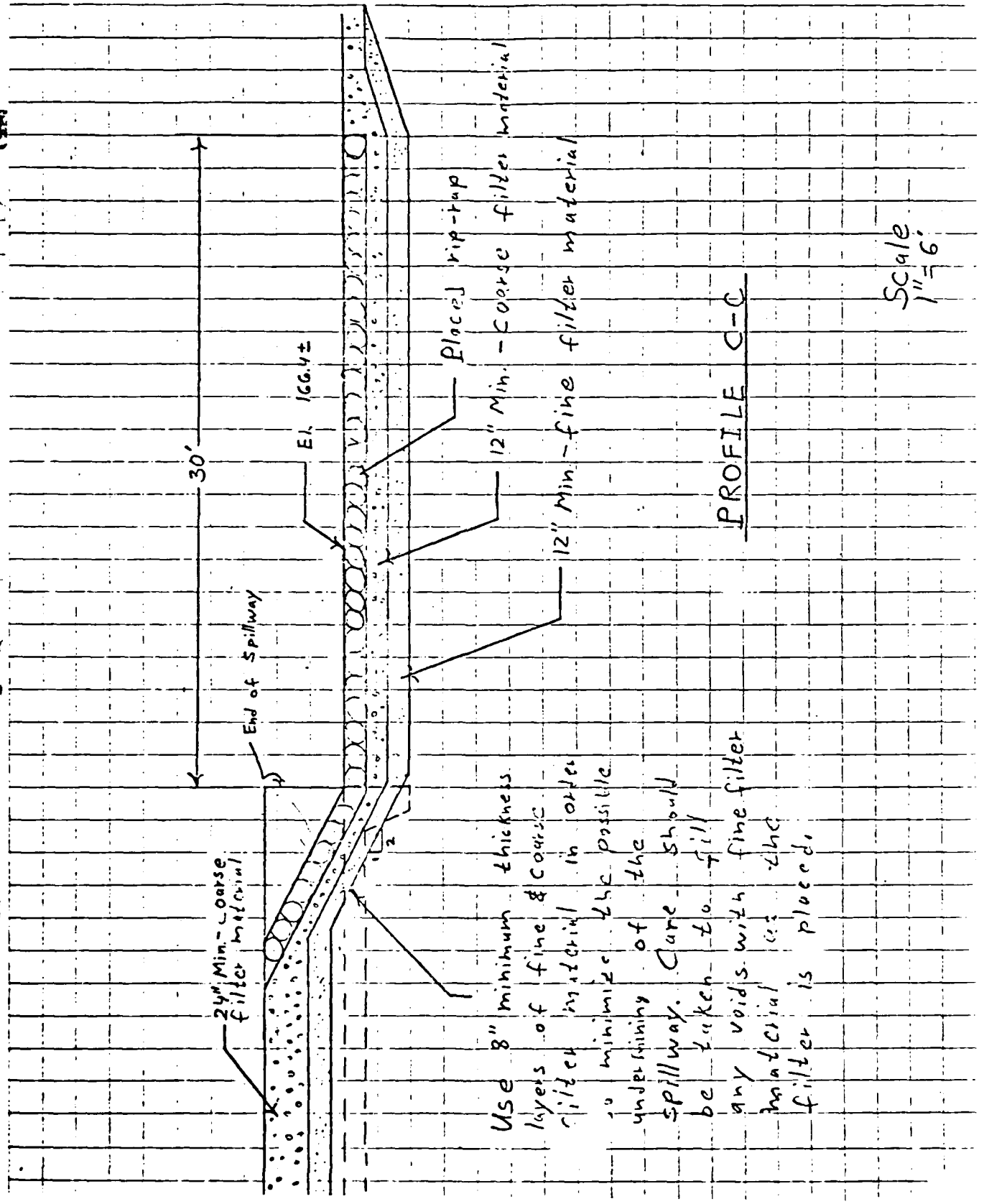


FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS
BOSTON

PROJECT Kohomoc Dam

FILE NUMBER WN-59(3)
SHEET NUMBER 3
DATE 2 July 1969
COMPUTED BY P.J. Mujeski
CHECKED BY

SUBJECT Control of Boils & Piping
Downstream of Dam

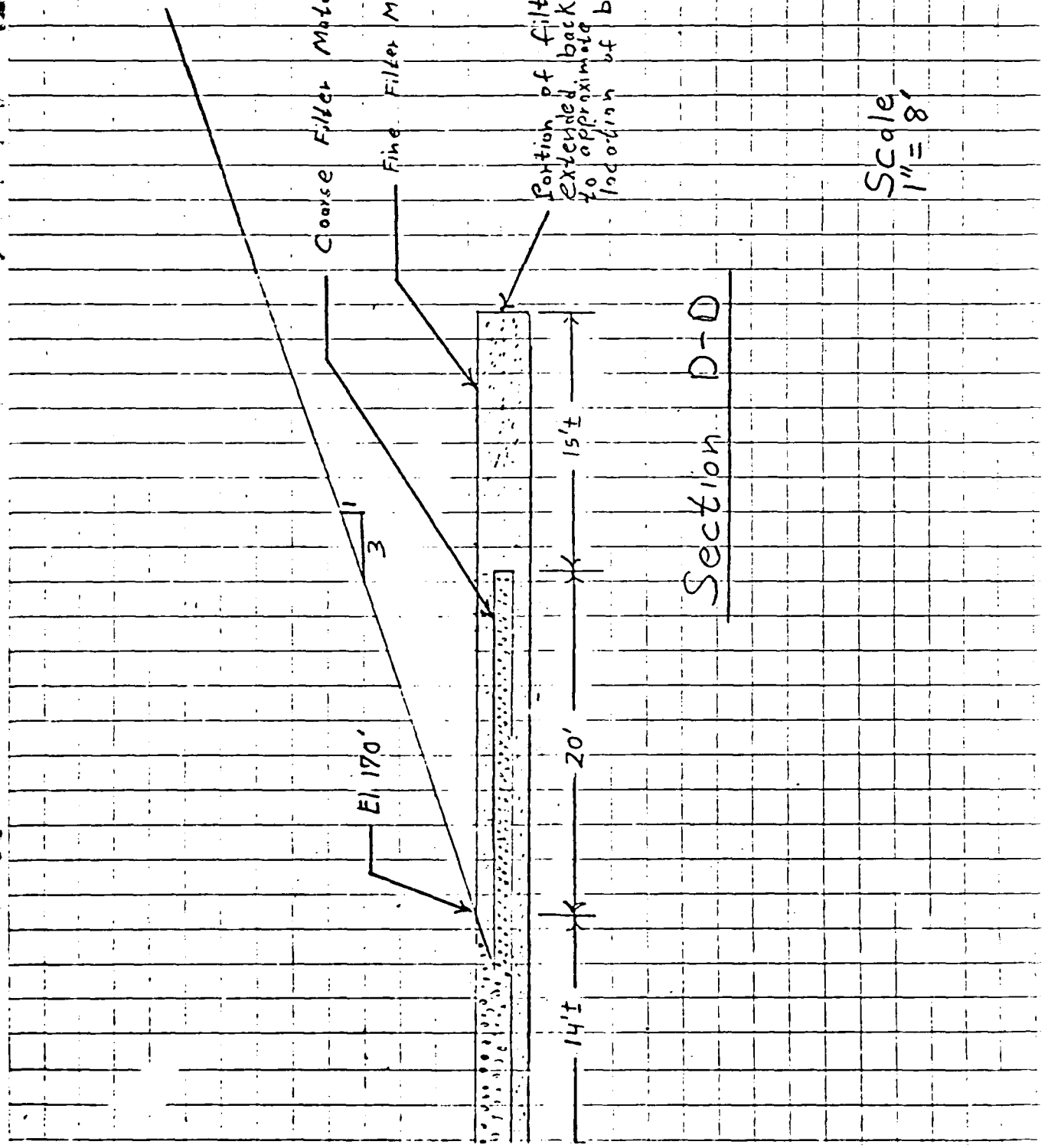


FAY, SPOFFORD & THORNDIKE, INC.
ENGINEERS
BOSTON

PROJECT Kahomac Dam

FILE NUMBER WN-5915)
SHEET NUMBER 4
DATE 7 July 1964
COMPUTED BY D. J. Morris
CHECKED BY

SUBJECT Control of Boils & Piping
Down-stream of Dam



A. J. MACCHI • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE 525-6631

MACCHI
HOFFMAN
SMID

CIVIL CONSULTANT
F. C. W. DUNHAM

July 22, 1969

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention: Mr. William H. O'Brien, III

Re: Konomoc Dam
Waterford, Connecticut

Gentlemen:

On Friday, July 18, 1969, I inspected the above site.

The contractor is installing a gravel filter blanket at the toe of the dam. As far as I know, this modification in construction was never cleared with the State. I have received no communication other than that this procedure was being considered.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

J. MACCHI
R. HOFFMAN
J. SCHMID

ASSOCIATE CONSULTANT
OF C. W. DUNHAM

June 18, 1969

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Re: Konomoc Dam
Waterford, Connecticut

Gentlemen:

Inspected the above-referenced project on Tuesday, June 17, 1969.

Contractor was finishing forming of spillway. No filling was going on at this time.

John Bousman mentioned that another boil at the end of spillway slab was noted. He said his office was considering removal of buried pipe in dam as mentioned in previous report. Also, excavating and refilling area of old gate house. Refill to be a silty-clay material.

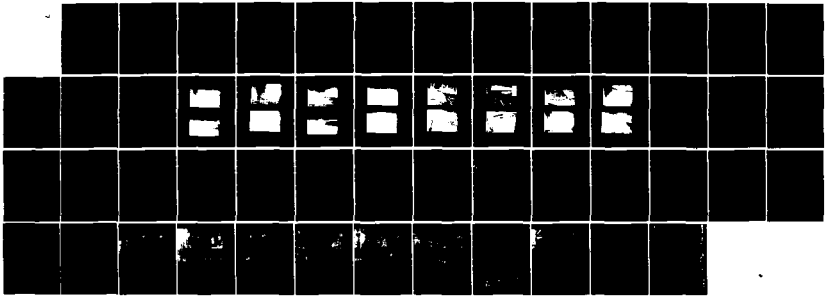
Very truly yours,

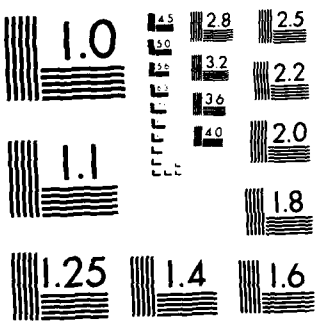
MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

AD-A143 447 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
LAKE KONOMOC DAM (CT..(U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV JUN 79

UNCLASSIFIED F/G 13/13 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

June 18, 1969

Mr. C. S. Mansfield
Fay, Spofford & Thorndike Engineers
11 Beacon Street
Boston, Massachusetts 02108

Subject: Lake Konomoc Dam
Waterford, Connecticut

Dear Mr. Mansfield:

Thank you for your letter of May 20, 1969 addressed to Mr. deBiasi, a copy of which was sent to us along with the annotated print.

On June 12, 1969, a meeting was held at the subject dam with our consultant, A. J. Macchi, a representative from your office, Peter Majeski, and your resident engineer John Bousman, concerning leaks or boils on the toe side of the dam near the spillway.

We are enclosing a copy of his report and feel that you should investigate the origin of these leaks more thoroughly, and determine if design revisions are in order to insure the safety of the dam.

There is also mention of a pipe, the end of which was crushed and left in place. This does not sound like a satisfactory way of treatment of this potential weak spot in the dam. We would like scale drawings of all pipes through the dam showing their sizes and locations in both plan and profile. It would seem important to plug the end of this pipe in some standard manner. Has the pipe been filled with concrete?

May we hear from you at your earliest convenience as to your intentions?

Very truly yours,

William H. O'Brien III
Civil Engineer

Enc.
WHO:vhb

cc: A. J. Macchi
Charles P. deBiasi

Water Resources Commission
State of Connecticut
Hartford, Connecticut June 13, 1969

The Engineers will review the problem with their main office and send a letter to the State as to what they plan to do.

In any event, they were told that conditions must be reported to Town officials and made a matter of record.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

A. J. MACCHI

cc.

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

. J. MACCHI
. R. HOFFMAN
J. SCHMID

ISSOCIATE CONSULTANT
ROF. C. W. DUNHAM

June 2, 1969

State of Connecticut
Water Resources Commission
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William H. O'Brien, III

Re: Lake Konomoc Dam
Waterford, Connecticut

Gentlemen:

On Thursday, May 29, 1969 Mr. A. J. Macchi and I visited the site of the above-referenced project now under construction.

The lake surface at the time of the visit was at about elevatioln 179.50. The new arch and spillway bottom were poured and the Contractor was forming the last lift of the new wall. Also in progress were backfilling of the upstream side of the dam and concreting of wall base west of spillway.

The Superintendent, Mr. Sacco, was asked if the well points had been cut off as was mentioned would be done over the long weekend. He said they were cut off and as a result a spring-leak developed at the toe of the dam on the east side of the spillway. This leak indicates a steady flow with a velocity of about 6" per second. The Superintendent said this leak existed before work was begun, but, dried up while the well points were working. This leak may be of little consequence now with a low level in the reservoir, however, this could greatly increase with the new reservoir level and we strongly recommend that this be corrected before completing the backfill of the dam.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS

KENNETH T. RAI

A. J. MACCHI • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE 525-6631

J. ACCHI
R. HOFFMAN
J. SCHMID

SOILS CONSULTANT
PROF. C. W. DUNHAM

April 18, 1969

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Re: Lake Konomoc DAM
Waterford, Connecticut

Gentlemen:

Inspected the above project on Thursday, April 17, 1969. Contractor was forming concrete cutoff wall at both ends of existing masonry wall which has been exposed.

A well point system is installed and operating behind the temporary cofferdam.

Reviewed precautions taken in anticipation of high runoff with the engineers who were present from the New London Public Works Department.

A build-up in reservoir elevation would deviate flow to a watercourse to the rear of the reservoir. Also, high capacity standby pumps are available if for any reason they are needed.

Very truly yours,

A. J. MACCHI, ENGINEERS

A. J. MACCHI

STATE WATER RESOURCES COMMISSION
RECEIVED
APR 21 1969

ANSWERED _____
REFERRED _____
FILED _____

FAY, SPOFFORD & THORNDIKE
ENGINEERS
BOSTON

COPY

June 20, 1967

Mr. H. R. Hoffman
Mr. A. J. Macchi
Engineers
44 Gillett Street
Hartford, Connecticut 06105

Subject: New London, Connecticut
Reconstruction of
Konomoc Dam and Reservoir

Dear Mr. Hoffman:

Mr. William P. Sander of the Water Resources Commission, State of Connecticut, has requested that we furnish directly to you the information which you requested in your letter of June 13, 1967, namely, (1) complete hydraulic data, and (2) results of test borings.

The pertinent hydraulic data may be summarized as follows:

Total Drainage Area - - - - - - 1.42 sq. mi.
Land Area 0.97 sq. mi.
Water Surface 0.45 " "
Total 1.42 " "

Length of Proposed Spillway Along Curve 51.67 ft.
Assumed Effective Length of Spillway 50.0 ft.

Proposed Spillway Capacity

Head on Spillway Ft.	Corresponding Freeboard Ft.	Total Discharge c.f.s.	Discharge Per Sq. Mi. of Drainage Area c.f.s.
0	5.0	0	0
2.0	3.0	467	328
2.5	2.5	653	452
3.0	2.0	858	603
3.5	1.5	1080	760
4.0	1.0	1320	928

PAY, SPOFFORD & THORNDIKE
ENGINEERS
BOSTON

COPY

We enclose one copy each of logs of borings, as follows:

At Konomoc Dam

Hole Nos. 10, 11, 12, 13, 14, 15, 16, 16a, 16b, 16c, 16d, 16e, 19 and 20
Hole Nos. C-1-67 to C-9-67, inclusive

At Great Swamp Dike

Hole Nos. B-2-67, B-3-67, and B-3-65

At Davis Pond Dike

Hole No. B-1-67

We trust this will give you the information you need. If anything further is required, please let us know.

Very truly yours,

PAY, SPOFFORD & THORNDIKE
By Lawrence M Gentleman

LMGentleman:rcl
Wn-59(3)
Enclosures
cc: Water Resources Commission

...N BOWMAN
...H I CANALY
...ROLL A. FARWELL
...PH W. HORNE
...LI... L. HYLAND
...IOL H. JONES
...VARD C. KEANE
...NR L. LINCOLN
...WA... J. WILLIAMS

FAY, SPOFFORD & THORNDIKE
ENGINEERS

11 BEACON STREET • BOSTON, MASSACHUSETTS 02108
Area Code 617 • 523-8300

BRIDGES AND OTHER STRUCTURES
WATER SUPPLY AND SEWERAGE
PORT AND TERMINAL WORKS
INDUSTRIAL BUILDINGS
EXPRESS HIGHWAYS
AIRPORTS

VALUATIONS
INVESTIGATIONS, DESIGNS
SERVICES DURING CONSTRUCTION

July 17, 1967

Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Attention: Mr. William P. Sander,
Engineer-Geologist

Subject: New London, Connecticut
Reconstruction at Lake Konomoc
Dam and Reservoir

Gentlemen:

In accordance with your request, we have reviewed the July 12, 1967, letter regarding the subject project, which was submitted to your office by A. J. Macchi, Engineers. Our reply in answer to their ten comments is as follows:

1. The contours shown at the site of the future pumping station are existing contours and shown by dashed lines. The future contour 186 will, of course, pass around the pumping station, since the station is to be constructed under another contract grading and other details are not shown on the Konomoc Dam set of drawings.

2. Two steps were taken to check condition and extent of the existing core wall and the upstream wall.

   a. A total of nine core borings was made to determine the elevation of the wall bottom. Of the nine core borings, three were made through the core wall, three through the upstream wall, two through the westerly abutment of the spillway, and one through the spillway. The location of each boring is shown on sheet No. 3 of the drawings.

b. Several test pits were dug at points along the core wall so that the masonry was uncovered at various depths up to a maximum of about nine feet. The portions uncovered appeared to be in satisfactory sound condition and the mortared joints appeared to be sound and watertight. A complete check of the wall could only be made by removal of a major portion of the earth embankment.

3. We have used the steel plate waterstop in the horizontal keyways. We prefer the metal plate to avoid the possibility of displacement during pouring of concrete. We think the concrete will protect the steel waterstop against corrosion as it does the reinforcing steel. We prefer to use the steel plates and will do so unless you require otherwise.

4. We will provide the cutoff as suggested. We do not understand the intent of the second sentence in regard to relocation of construction joints. Please provide more specific instructions.

5. Clause (6.3) Rolled Fill Embankment Materials, has been revised to read as follows:

"The rolled fill embankment shall be constructed of sand and gravel obtained from borrow areas as prescribed hereinafter, and from other required excavations as prescribed in Section 3, STRIPPING AND EXCAVATION. The material shall be semi-impervious and shall meet the following composition limits by weight and other characteristics after particles larger than 1 inch have been removed from the sample.

Square Mesh Sieves	Per Cent by Weight Passing
1-inch	100
3/4-inch	95-100
3/8-inch	90-100
No. 4	85-98
No. 10	80-97
No. 20	70-93
No. 40	55-85
No. 100	35-60
No. 200	20-45

Not more than 10 per cent shall be finer than the 0.01 millimeter size. It is intended to make maximum use of available materials on the site. The suitability of materials shall be subject to approval of the Engineer."

No frozen material, snow, or ice shall be placed in the embankment.

6. The Great Swamp is practically level. It can drain to the northeast into the Hunts Brook drainage area. The existing concrete culvert can be left in place and the dike constructed by the City to divert runoff from Great Swamp to Lake Konomoc can be breached.

7. Turner Road is approximately the northern limit of Lake Konomoc drainage area. Drainage from the area north of Turner Road will be to Davis Pond.

8. Hot pitch will be used instead of asphaltum.

9. Concrete is specified as "Air Entrained" - see Section 5 - Concrete, of the Specifications.

10. The proposed project does not change the drainage area above the culvert. We would not expect that the same design criteria should be used for the culvert as for the spillway of the dam. However, we do not consider it a part of this project to propose how the Connecticut State Highway Department should design its culverts.

If you have any further questions, or require any additional information, please do not hesitate to contact our office.

Very truly yours,

FAY, SPOFFORD & THORNDIKE, INC.
By C. S. Mansfield

CSMansfield:bmt
Wn-59(3)

cc: Mr. Charles P. de Biasi

.. J. MACCHI • ENGINEERS

ECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE 525-6631

J. I .CCHI
R. HOFFMAN
L E 4MID

OC E CONSULTANT
DF. C. W. DUNHAM

July 12, 1967

Mr. William P. Sander
Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Re: Reconstruction of Konomac Dam
and Reservoir, New London, Connecticut

Dear Mr. Sander:

We have reviewed the plans and specifications for the above referenced project as requested in your letter of June 1, 1967. Our comments are as follows:

1. At the east end of the dam the new waterline contour 186.00 passes through the profile of the future pumping station. Is this the intent of the designing engineer?

2. The condition of the existing core wall should be verified by the engineer in the field as to its soundness prior to construction of the new core wall cap.

3. It is suggested that the 1/4" steel plate water-stop in the 8" x 12" keyway be replaced with one of a non-corrosive material such as rubber or P.V.C.

4. In Section 9/4 (Section through spillway) we suggest providing a cutoff at the upper edge by extending a concrete wall to key a minimum of 2' into the existing rip-rap. Also, we suggest moving construction joints on top of the existing wall so that bearing is provided for all sections.

5. A gradation limit should be established on the drawings or in the specifications as a standard for acceptable embankment material to comprise the rolled fill in the downstream face.

6. New Great Swamp Dike cuts off the natural drainage of Great Swamp. How is this drainage provided for? New elevation of the reservoir is 186.00. Existing Great Swamp elevation varies from 181.00 to 182.00. Also, what happens to the existing concrete culvert?

7. At Davis Pond Dike, after removal of the existing 15" V.C. drain, how will drainage be provided for in the area north of Turner Road?

8. It is suggested that the top and sides of the existing core wall be given a coat of hot pitch in lieu of Asphaltum.

9. Under "Structural Notes" on Sheet #3, concrete shou be specified as "Air Entrained."

10. The capacity of the existing 36" C.M.P. culvert unc r Route 85 should be investigated and if found inadequate, brought to the attention of the Connecticut State Highway Department.

If there are any questions concerning these comments, please do not hesitate to contact us.

Very truly yours,

A. J. MACCHI ENGINEERS

Ronald J. Dellaripa

RONALD J. DELLARIPA

vmc
cc

JN BOWMAN
ZI CAMALY
ARROLL A. FARWELL
LPH V. HORNE
LLI L. MYLAND
RO H. JONES
WARD C. KEANE
ANK L. LINCOLN
WA J. WILLIAMS

FAY, SPOFFORD & THORNDIKE
ENGINEERS

11 BEACON STREET • BOSTON, MASSACHUSETTS 02108
Area Code 617 • 523-8300

BRIDGES AND OTHER STRUCTURES
WATER SUPPLY AND SEWERAGE
PORT AND TERMINAL WORKS
INDUSTRIAL BUILDINGS
EXPRESS HIGHWAYS
AIRPORTS

VALUATIONS
INVESTIGATIONS, DESIGNS
SERVICES DURING CONSTRUCTION

May 26, 1967

State of Connecticut
Water Resources Commission
State Office Building
Hartford, Connecticut 06115

Subject: Application for Construction Permit for Dam

Gentlemen:

On behalf of the City of New London we enclose one executed copy of your Form D-4, Application for Construction Permit for Dam. This application is for reconstruction of Konomoc Dam and for new construction of Great Swamp and Davis Pond Dikes, all on Lake Konomoc in the Towns of Waterford and Montville. It has been signed by Mr. Charles P. deBiasi, Director of Public Works for the City of New London.

Three sets of the proposed contract drawings and detailed specifications are being sent under separate cover.

Please advise if any further information is required.

Very truly yours,

FAY, SPOFFORD & THORNDIKE
By Lawrence M. Gentleman

LMGentleman:mc
Wn-59(3)
Enclosure
cc: Mr. Charles P. deBiasi

FORM D-4

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
State Office Building
Hartford, Connecticut

APPLICATION FOR CONSTRUCTION PERMIT FOR DAM

1e City of New London Date May 25, 1967

). Address Municipal Building

New London, Connecticut Tel. No. 203-442-9428

cation of Structure:
Konomoc Dam is in Waterford, Conn.
Great Swamp Dike is in Montville, Conn.
own Davis Pond Dike is in Montville, Conn. Shown on USGS Quadrangle Montville, Conn. N41°22'30"W72°07'30" 7½ Min. Series

am of Stream Lake Konomoc at 5.7 inches ~~south~~ north of Lat. 41°22'30"
and 9.2 inches east of Long. 72°15' ~~west~~

re tions for reaching site from nearest village or route intersection:
(see sketch on reverse side)
no oc Dam is adjacent to Connecticut Route 85, about 4000 feet southerly of the
Mo tville-Waterford Town Line.
eat Swamp Dike and Davis Pond Dike are both adjacent to Turner Road,
about 7000 feet and 1200 feet, respectively, from Route 85.

his is an application for: (New Construction) (Alteration) (Repair) (Removal)
lte ation of Konomoc Dam (check one or more of above)
ew, onstruction of Great Swamp Dike and Davis Pond Dike
his pond is to be used for: Municipal Water Supply

im sions of Pond: width 2400 feet length 9000 feet area 290 acres

ax mum depth of water immediately above dam: 20 feet at Konomoc Dam; 6 feet at Great Swamp Dike; 3 feet at Davis Pond Dike

otal length of dam: Konomoc Dam 1600 feet; Great Swamp Dike 370 feet; Davis Pond Dike 95 feet

er th of spillway: 50 feet at Konomoc Dam; None at Great Swamp Dike; None at Davis Pond Dike

eight of abutments above spillway: 5.0 feet at Konomoc Dam

yp of spillway construction: Concrete Masonry

yp of dike construction: Earth Embankment with Masonry Core Wall at Konomoc Dam
Earth Embankment at Great Swamp and Davis Pond Dikes

pillway section will be set on: (Bedrock) (Gravel) (Clay) (Till)
x
(check one of above)

le rks:

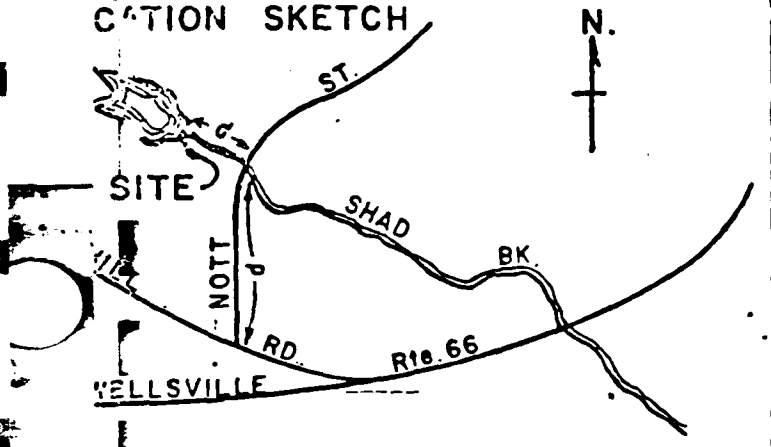
Signed: [signature]
(owner)

Name of Engineer, if any Fay, Spofford & Thorndike
11 Beacon Street, Boston, Mass.

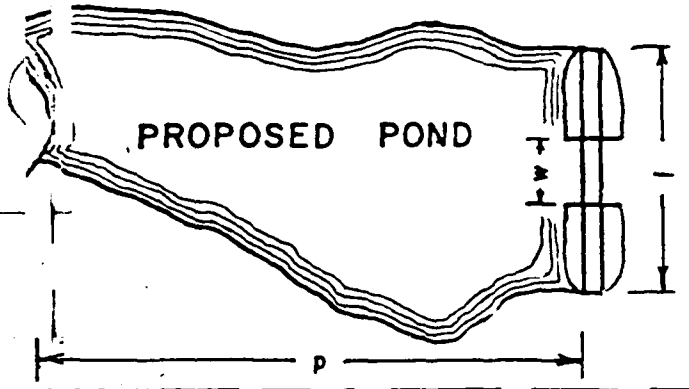
Note: Show details of construction on reverse side

SAMPLE DATA

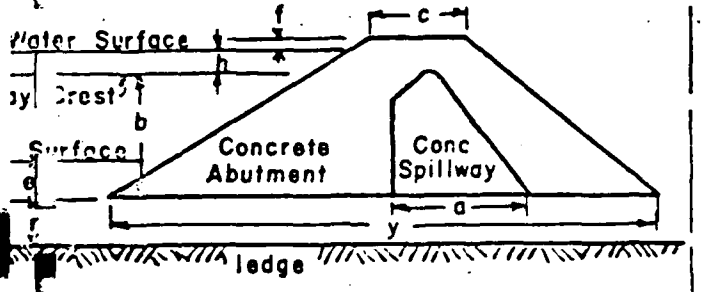
CATION SKETCH



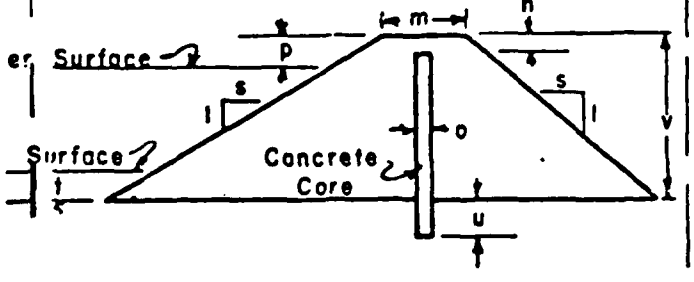
TE PLAN



L WAY SECTION



KE SECTION



APPLICANT'S DATA

Show only features of sample which are applicable and dimensions which reflect your inte

LOCATION SKETCH

See proposed contract drawings for all sketches

SITE PLAN

SPILLWAY SECTION

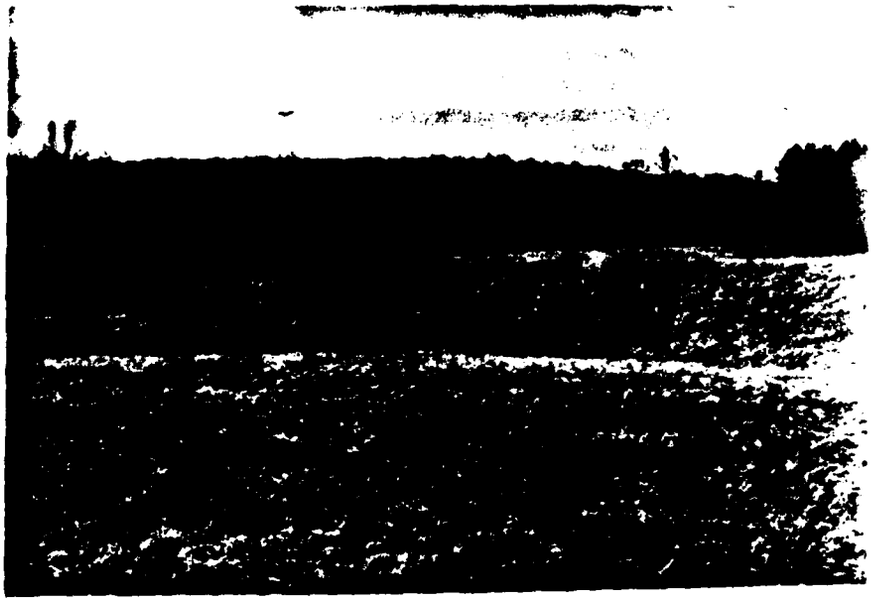
NOTE...
If there are two methods of discharge Show Bo

DIKE SECTION

APPENDIX C

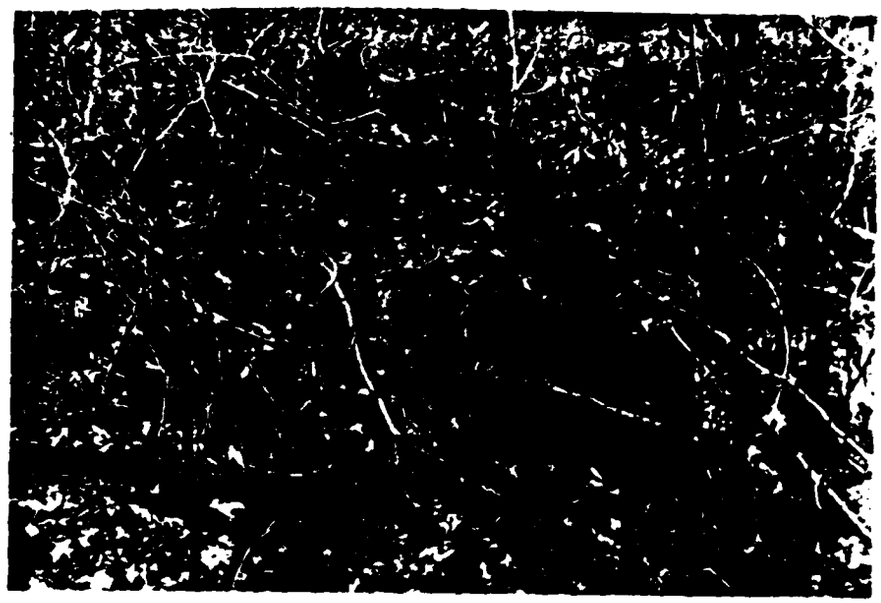
PHOTOGRAPHS

1. Upstream face of dam and left abutment dike.



2. Downstream face of dam.

3. Seepage at downstream toe of left abutment dike.



4. Seepage at downstream toe of road opposite the "Frog Pond".

5. View along crest of right abutment dike.

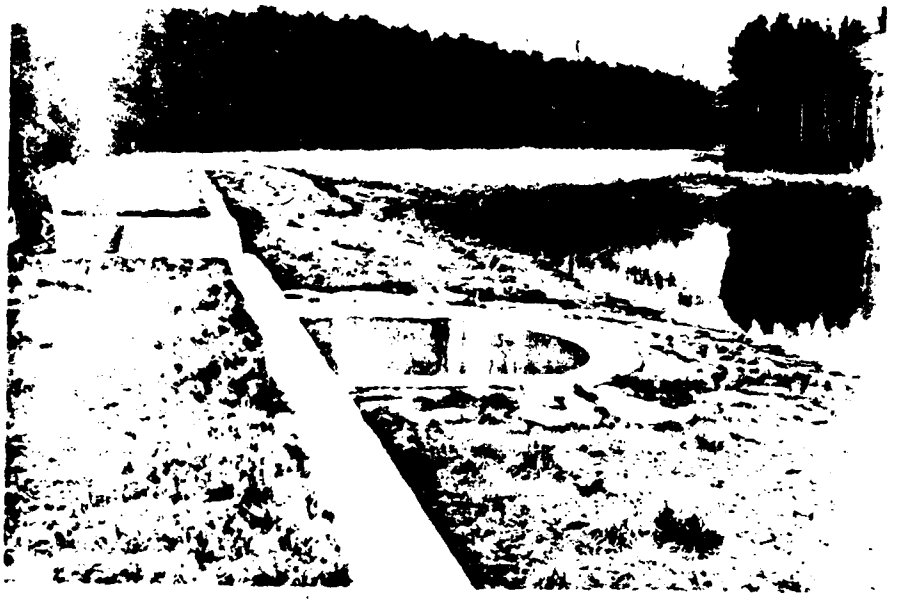
6. Upstream face of Great Swamp Dike.

7. Downstream face of Great Swamp Dike.

8. View along crest of Great Swamp Dike.

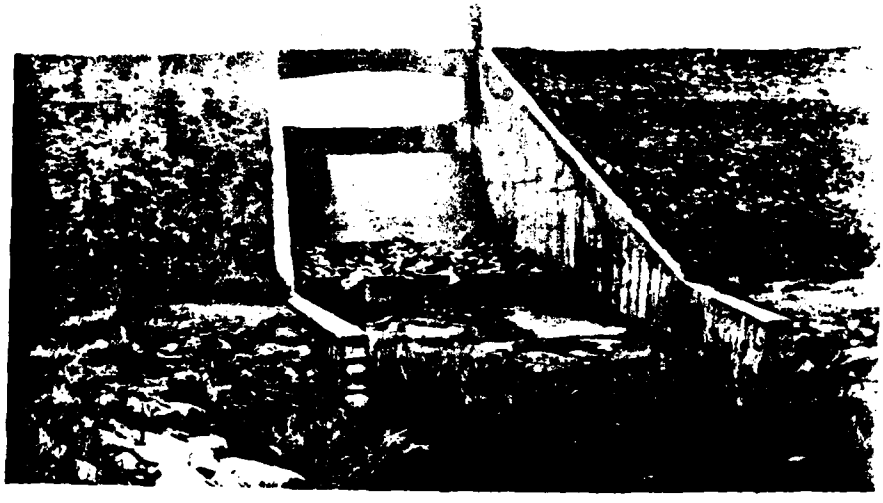
9. Upstream face of Davis Pond Dike.

10. Downstream face of Davis Pond Dike.



11. Overview of spillway crest.

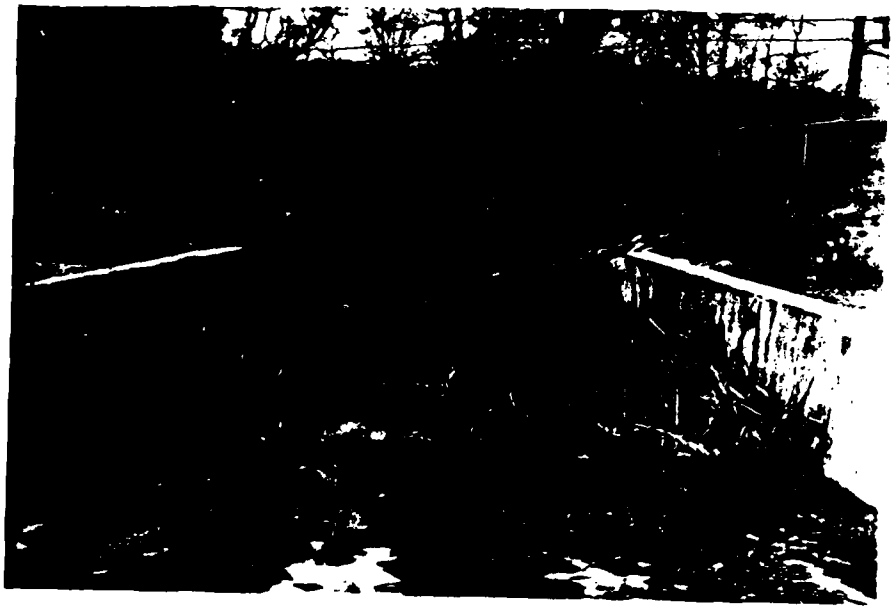
12. View of spillway.



13. View of spillway chute from downstream channel.

14. Stilling basin apron with rock riprap.

15. Deteriorated spillway concrete training wall.



16. Downstream spillway channel.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

ENTIRE DRAINAGE AREA - USGS

READING #2	85.78	85.41		
" #1	76.17	85.78	AVE 9.62 IN²	
	9.61	9.63		

AREA = 883.4 ACRES = 1.38 MI²

LAKE SURFACE AREA @ ELEV 180 USGS

READING #2	97.87	100.35		
" #1	95.41	97.87	AVE 2.47 IN²	
	2.46	2.48		

AREA = 226.8 ACRES = 0.35 MI²

@ ELEV 190 USGS

READING #2	03.78	07.39		
" #1	00.19	03.79	AVE 3.595 IN²	
	3.59	3.60		

AREA = 330.1 ACRES = 0.52 MI²

@ ELEV 200 USGS

READING #2	11.77	16.15		
" #1	07.39	11.77	AVE 4.38 IN²	
	4.38	4.38		

AREA = 402.2 ACRES = 0.63 MI²

@ ELEV 186 DESIGN POOL FAY, SPOFFORD, & THORNDIKE PLAN (SCALE 1" = 800)

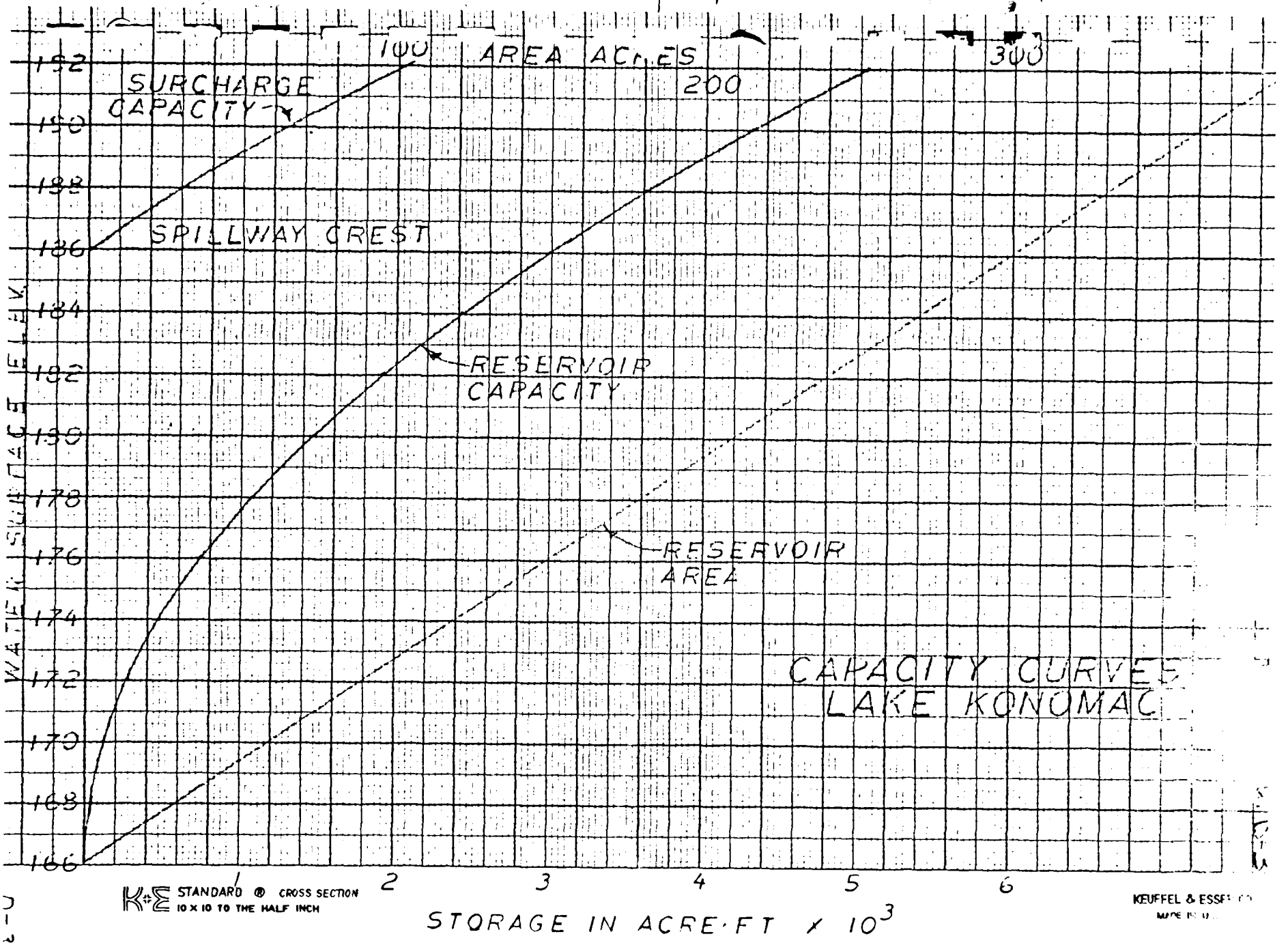
READING #2	29.44	50.44		
" #1	08.43	29.44	AVE = 21.00	
	21.01	21.00		

AREA = 308.5 ACRES = 0.48 MI²

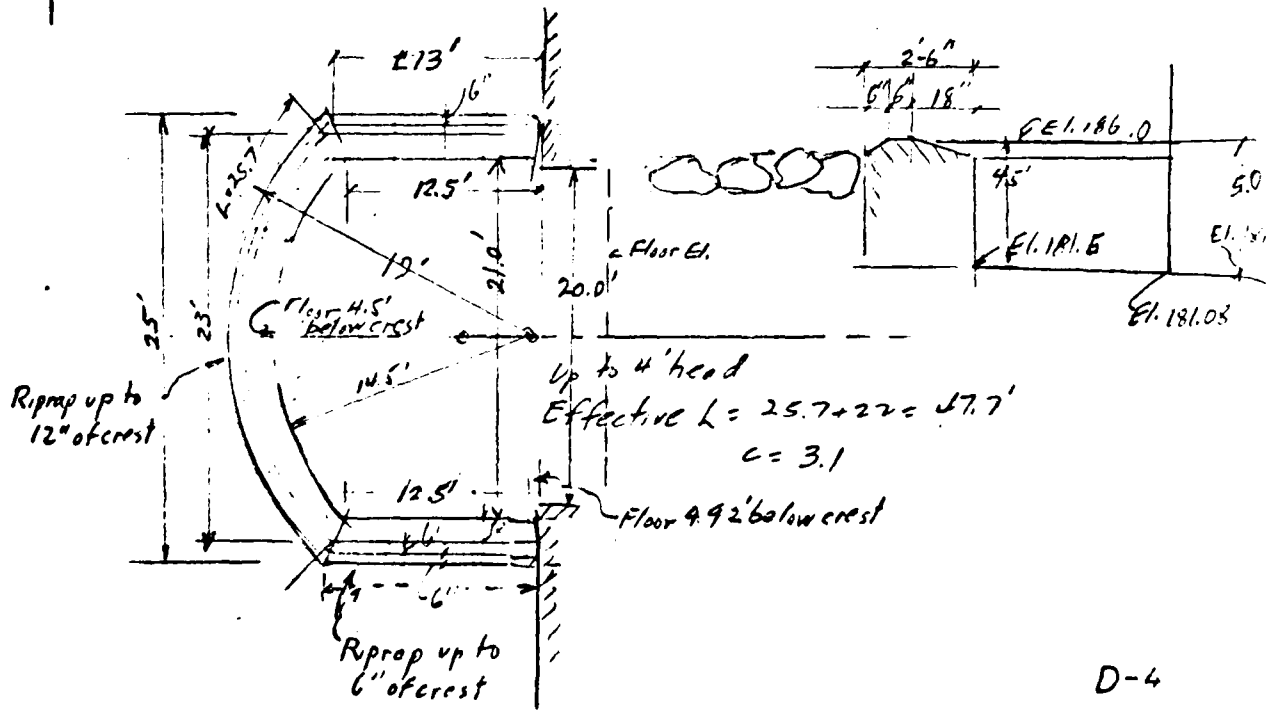
BY RFB DATE 5/3/79 LOUIS BERGER & [illegible]
CHKD. BY _____ DATE _____ INSPECTION OF DAMS
SUBJECT LAKE KENNEDY, H&H

RESERVOIR CAPACITY CURVES

ELEV. FT	AREA ACRES	AVE AREA ACRES	ΔH FT	ΔS ACRE FT	ΣS ACRE FT	SURCHARGE STG ABV ACRE-FT
166	0	0	2	0	0	
168	29	14.5		29	29	
170	59	44.0		88	117	
172	89	74.0		148	265	
174	119	104		208	473	
176	149	134		268	741	
178	179	164		328	1069	
180	209	194		388	1457	
182	239	224		448	1905	
184	269	254		508	2413	
186	299	284		568	2981	
188	329	314		628	3609	628
190	359	344		688	4297	1316
192	389	374	2	748	5045	2064

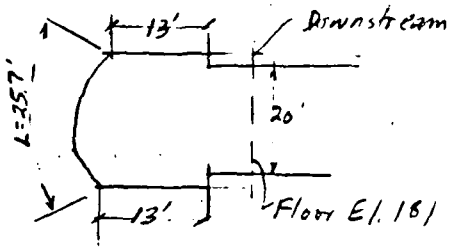

AREA ACRES
100
200
300
SURCHARGE CAPACITY
SPILLWAY CREST
RESERVOIR CAPACITY
RESERVOIR AREA
CAPACITY CURVES
LAKE KONOMAC
WATER SURFACE ELEV.
192
190
188
186
184
182
180
178
176
174
172
170
168
166
1
2
3
4
5
6
STORAGE IN ACRE-FT x 10³
K+E STANDARD ® CROSS SECTION
10 X 10 TO THE HALF INCH
KEUFFEL & ESSER CO.

	SPILLWAY				ABUTMENTS				Q
ELEV	H	C	L	Q	H	C	L	Q	TOTAL
186	0	3.3	50	0	0	2.7	1720	0	0
187	1	↓	↓	165	0	↓	↓	0	165
188	2			467	0			0	467
189	3			858	0			0	858
190	4			1320	0			0	1320
191	5			1845	0			0	1845
191.1	5.1			1900	0.1			147	2047
191.2	5.2			1957	0.2			415	2372
191.3	5.3			2013	0.3			763	2776
191.4	5.4			2070	0.4			1175	3245
191.5	5.5			2128	0.5			1642	3770
191.6	5.6			2186	0.6			2158	4344
191.7	5.7			2245	0.7			2720	4965
191.8	5.8			2305	0.8			3323	5628
191.9	5.9	↓	↓	2365	0.9	↓	↓	3965	6330
192	6	3.3	50	2425	1	2.7	1720	4644	7069

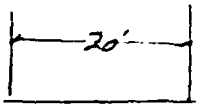


BY CJH DATE 5-11-79
CHKD. BY ____ DATE ____
SUBJECT KONOCKLAKE - [illegible]

SHEET NO ____
PROJECT ____



Discharge thru control section



$d_c = 2h_{vc}$

Control flow Depth-d_c ft	hv_c	v_c	q_c	$d_c + 1.1hv_c$ (Considering 0.1 hvc-side channel loss)	Qc	Upstream gradient	
2	1.0	8.02	16.04	3.1	321	184.1	
3	1.5	9.83	29.49	4.15	590	185.65	
4	2.0	11.35	45.4	6.20	908	187.2	
5	2.5	12.69	63.45	7.75	1269	188.75	
6	3.0	13.90	83.4	9.30	1668	190.3	← Top of dam El. 19.

Weir flow.

Elev.	H	Effective length	C	Q	Side channel gradient	% submergence of crest	
186.0	0			0			
187	1.0	51.7	3.15	163	182.7	0	
188	2.0	51.0	3.15	454	184.8	0	
189	3.0	50.0	3.15	818	186.9	30	
190	4.0	48.5	3.15	1222	188.7	67	← Start of submergence
191	5.0	47.0	2.96	1524	189.8	76	Reduction in coeff = 6% 3.15 × .94 = 2.96 ok.
192	6.0	46.0	2.80	1893	191.0	83	3.15 × .88 = 2.77 ok

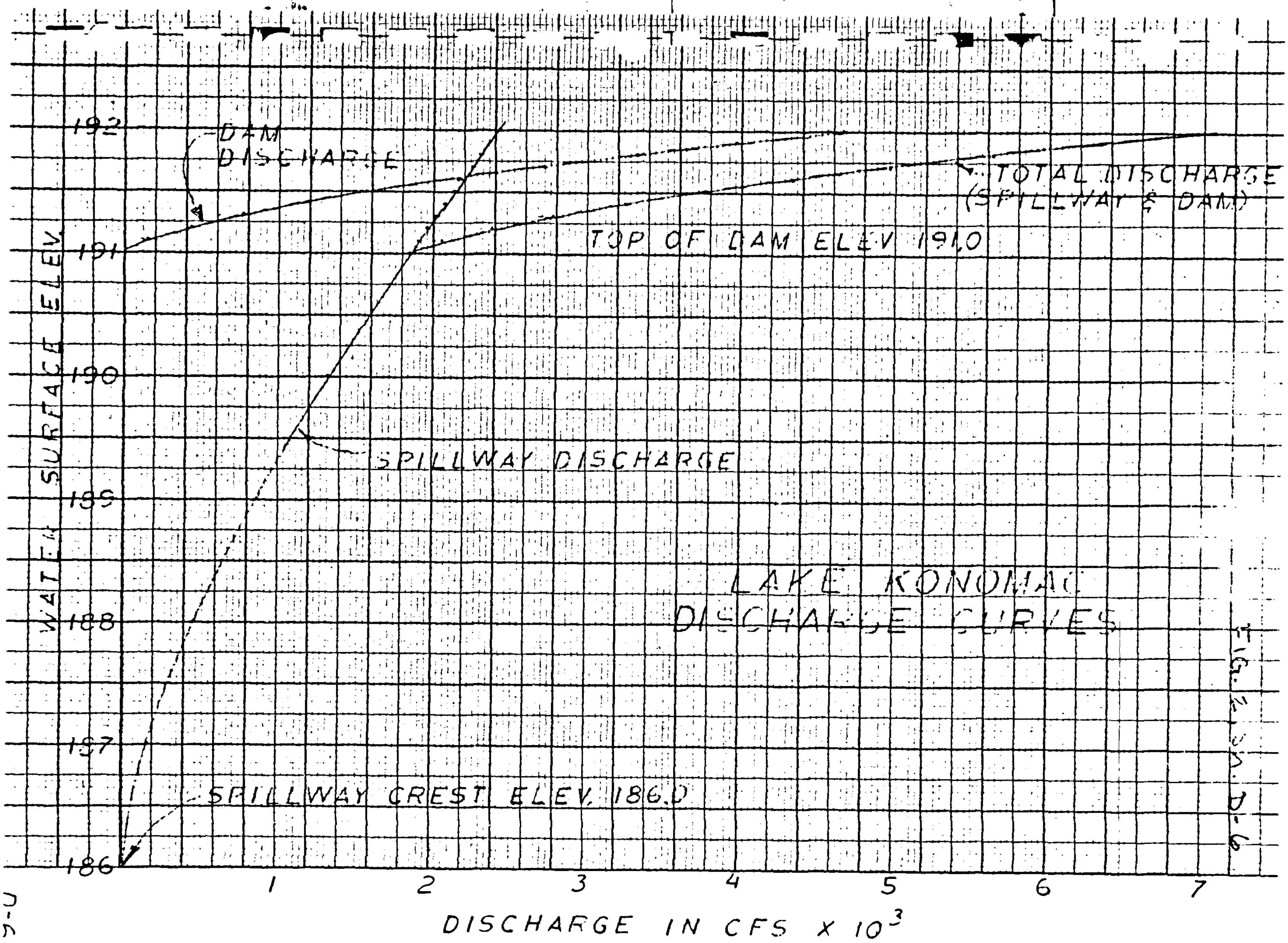

LAKE KONOMAC
DISCHARGE CURVES
WATER SURFACE ELEV.
DISCHARGE IN CFS X 10^3
192
191
190
189
188
187
186
1
2
3
4
5
6
7
DAM DISCHARGE
TOTAL DISCHARGE (SPILLWAY & DAM)
TOP OF DAM ELEV 191.0
SPILLWAY DISCHARGE
SPILLWAY CREST ELEV. 186.0

FIG. 2, SH. D-6

BY REB DATE 5/2/74 **LOUIS BERGER & ASSOCIATES INC.** SHEET
CHKD. BY DATE INSPECTION OF DAMS PROJECT
SUBJECT LAKE KONOMAC, HEH, RESERVOIR ROUTING

DRAINAGE AREA = 1.38 MI² = 883 ACRES
SIZE CLASSIFICATION - INTERMEDIATE
MAXIMUM STORAGE = 4,660 ACRE FT
HEIGHT = 23 FT
HAZARD CLASSIFICATION = SIGNIFICANT
OCE GUIDELINES, USE ½ PMF TO PMF

USE FULL PMF :. FROM INFLOW HYDROGRAPH
Q = 4500 CFS

STEP 1 Q_{P1} = 4500 CFS

STEP 2a ELEV = 191.65

STEP 2b SURCHARGE VOL = 1920 ACRE-FT

$$\text{INCHES RUNOFF} = \frac{1920 \text{ ACRE FT}}{883 \text{ ACRES}} \times 12 \text{ IN/FT} = 26.1''$$

$26.1'' > 19''$

TRY GRAPHIC SOLUTION

RESULTS OF GRAPHIC SOLUTION

$Q_{P2} \doteq$ 1120 CFS @ ELEV 189.7

SPILLWAY WILL PASS PMF WITHOUT OVERTOPPING

DRAINAGE AREA (TOTAL) = 1.38 SQ MI = 883 ACRES

RESERVOIR AREA @ ELEV 186 = 0.48 SQ M = 308 ACRES

35% OF TOTAL

∴ OVERLAND RUNOFF = 0.90 SQ MI 575 ACRES

NOW LENGTH OF LONGEST WATER COURSE, L = 3000 FT
L = 0.57 MI

& ELEV DIFFERENCE = 400 − 186 = 214 FT

∴ SLOPE = $\frac{214}{0.57}$ = 375 FT/MI & $\sqrt{S}$ = 19.36

NOW $\frac{LL_c}{\sqrt{S}} = \frac{(0.57)(0.57)}{2\sqrt{375}} = 0.0084$

$\left(\frac{LL_c}{\sqrt{S}}\right)^{0.33} = (0.0084)^{0.33} = 0.207$

$LAG = K\left(\frac{LL_c}{\sqrt{S}}\right)^{0.33} = 0.207K$

ASSUME K = 5.0 HRS (REFER TO "CURVE B", MOUNTAINOUS REGION, MIXED TERRAIN, BOR REF)

LAG = (5.0)(.207) = 1.04 HRS

$T_p = 0.41D + .82\,LAG$, D = 1.0 HRS

$T_p = 0.41(1)(.82)(1.04)$

$T_p = 0.41 + 0.85 = 1.26$ HRS

CHECK VELOCITY

$V = \frac{L}{LAG \times 3600} = \frac{3000}{(1.04)(3600)} = 0.80$ FPS O.K

$T_R = 1.67\ T_p = 1.67\ (1.26) = 2.10$ HRS

$T_B = T_p + T_R = 1.67 + 2.10 = 3.77$ HRS

---

q_p = PEAK RATE IN CFS

$$q_p = \frac{484\ A\ Q}{T_p}$$

A = DRAINAGE AREA
Q = RUNOFF IN INCHES

$$q_p = \frac{484\ (.90)(1)}{1.26} = 346 \text{ CFS}$$

COMPUTE DIRECT RUNOFF ON LAKE

1 IN/HR = 645.3 FT^3/SEC PER SQ. MI

1 IN/HR = (645.3)(0.48) = 310 CFS

PMD = PROBABLE MAXIMUM PRECIPITATION

= (24")(0.8) = 19.2" FOR CONNECTICUT

= 18.8" CONSIDERING INFILTRATION FOR OVERLAND FLOW.

BY REB DATE 5/21/79 ASSOCIATES INC. SHEET NO. 0

CHKD. BY DATE PROJECT

SUBJECT Lake Kananaskis

Flood Hydrograph for PMF $q_p = 346$

Time (Hours)	Rainfall *%	Rainfall Inches	Q_p cfs	Begin Time	Peak Time	End Time	Direct Runoff
0.0	-						
1.0	10	1.88	650	0	1.26	3.77	583
2.0	12	2.26	782	1.0	2.26	4.77	701
3.0	15	2.82	976	2.0	3.26	5.77	874
4.0	38	7.14	2470	3.0	4.26	6.77	2213
5.0	14	2.63	910	4.0	5.26	7.77	815
6.0	11	2.07	716	5.0	6.26	8.77	642

* Distribution of Maximum 6 hour SPS or PMP in percent of 6 hour amount per EM 1110-2-1411

BY RFB DATE 5/2/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO.

CHKD. BY DATE PROJECT

SUBJECT LAKE KOCANUSA, N.H., DOWNSTREAM HAZARD ANALYSIS

USE 'ROLE OF THUMB' METHOD

D/S HAZARD ANALYSIS - USING MAXIMUM POOL ELEVATION OF 189.7 TO DETERMINE BREACH DISCHARGE.

STEP 1: STORAGE = 4100 CFS ACRE-FT @ TIME OF FAILURE.

STEP 2: $Q_{p1} = 8/27\, W_b \sqrt{g}\, Y_o^{3/2}$

$W_b = 40\% \text{ of } 300 = 120$ FT, $Y_o = 21.7$ FT.

$Q_{p1} = 1.68(120)(21.7)^{3/2} = 20{,}380$ CFS

ADD SPILLWAY DISCHARGE OF 1120 CFS

$Q_{p1} = 1120 + 20{,}380 = 21{,}500$ CFS

STEP 3: 1ST REACH $L = 3600$ FT

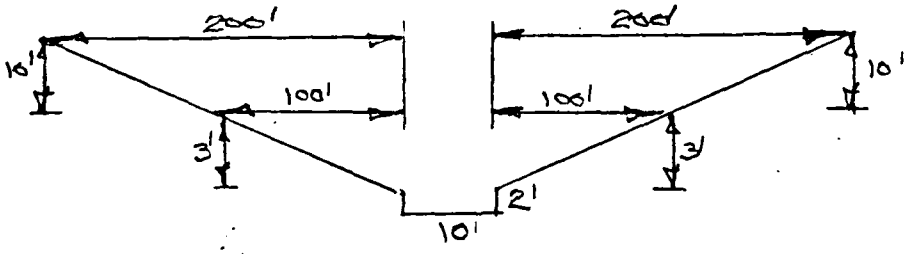
$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$Q = 0.813 A R^{2/3}$

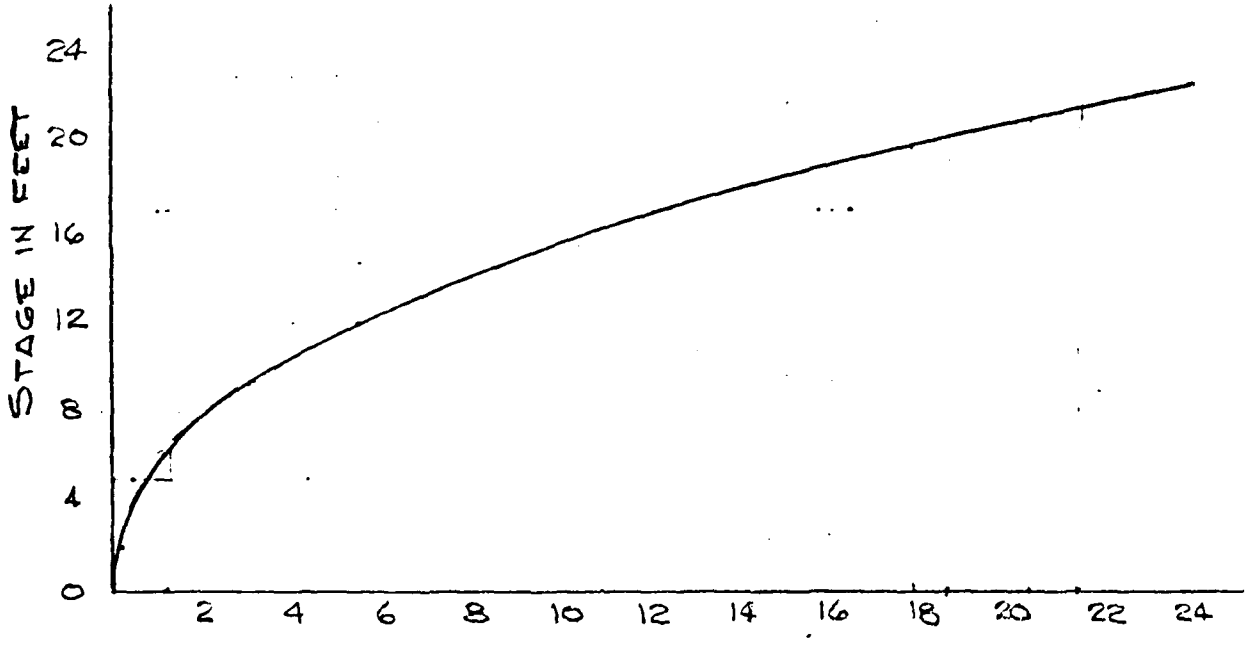
$S = \frac{168-160}{3000} = .00267$

$S^{1/2} = 0.052$

$n = .095$



H	ΔA	A	P	R	$R^{2/3}$	Q
2	20	20	14	1.43	1.23	20
5	350	370	214	1.73	1.44	433
12	1600	1970	314.4	6.27	3.40	5445
17	2560	4270	414.6	10.29	4.73	16425
22	2550	6820	515.2	13.24	5.60	31050



STEP 4 FOR Q_{p1} = 21,500 , STAGE 21.5 FT

AREA ≅ 6565 ∴ V_1 = 543. ACRE.FT

$$Q_{p2\,(TRIAL)} = Q_{p1}\left(1-\frac{V_1}{S}\right) = 21{,}500\,(1-.132)$$

$$= 18{,}660$$

FOR Q = 18,660 STAGE = 20.1 FT

AREA ≅ 6361 ∴ V_2 = 525 ACRE.FT

VAVE = 534 FOR 1120 STAGE = 6.2'

$$Q_{p2} = 21{,}500\left(1-\frac{534}{4100}\right) = 18{,}700 \text{ STAGE } 20.2$$

STEP 3 2ND REACH LENGTH = 3600 FT

$$S = \frac{160-150}{3000} = .0033$$

$S^{1/2} = 0.058$

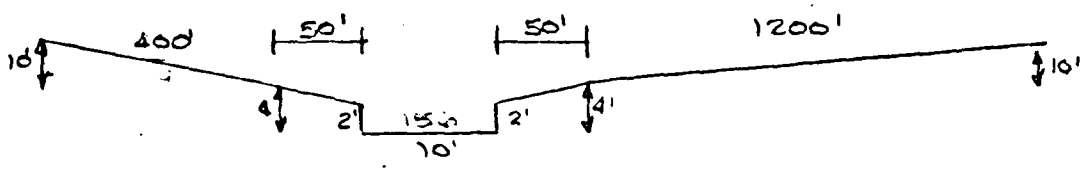
$n = .075$

$Q = 1.15\,AR^{2/3}$

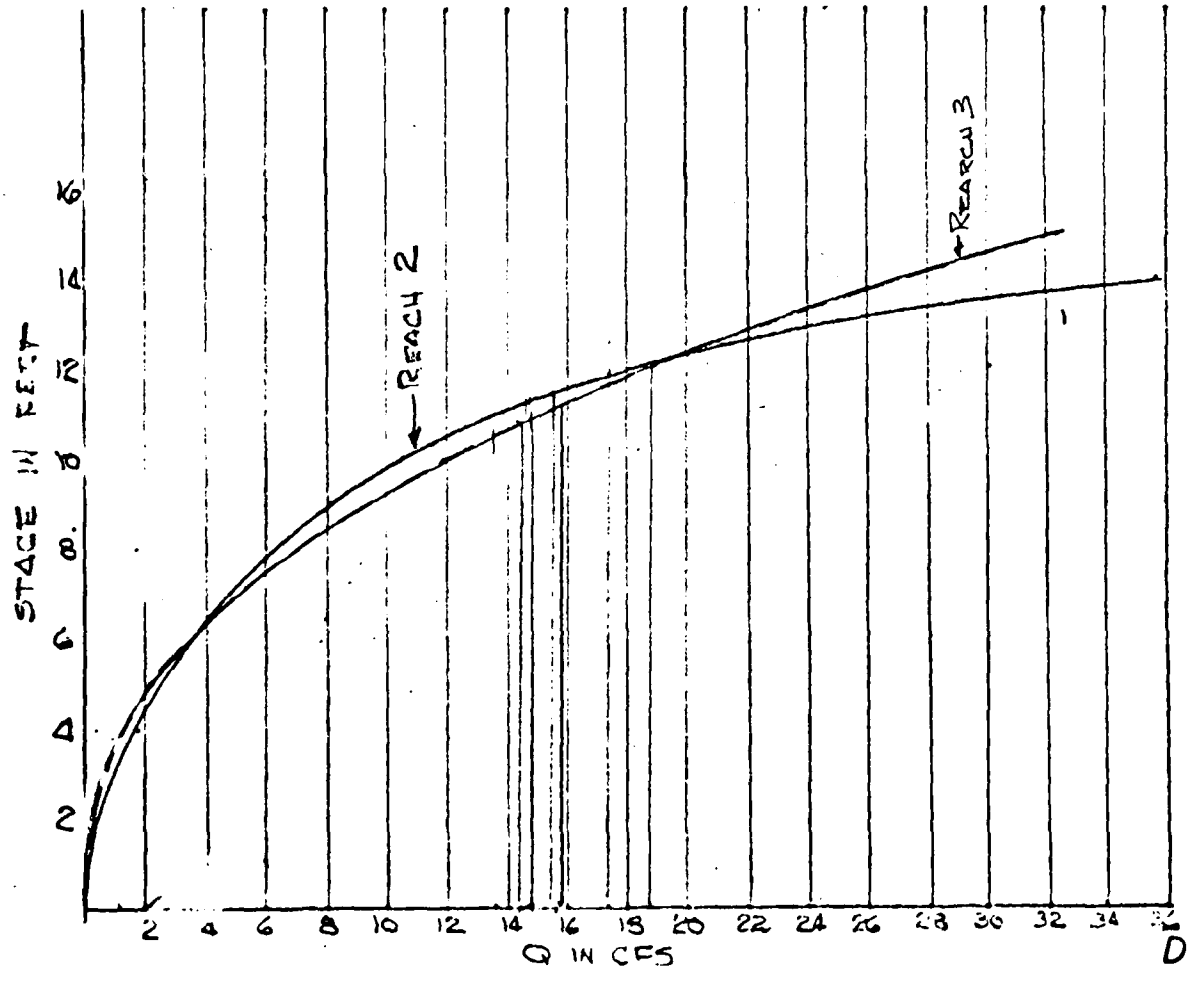
BY RFB DATE 5/4/79 LOUIS BERGER & ASSOCIATES INC. SHEET NO. 3 OF

CHKD. BY DATE INSPECTION OF DAMS PROJECT

SUBJECT LAKE KONDMOK, NH, FLOWAGE EASEMENT HEARING EXHIBITS



H	ΔA	A	P	R	$R^{2/3}$	Q
2	20	20	14	1.43	1.27	30
4	120	140	114	1.23	1.15	185
9	3050	3190	914	3.49	2.30	8070
14	6550	9740	1714	5.68	3.19	35730
12	4890	8080	1394	5.80	3.23	30,015



STEP 4 2ND REACH $Q_{P1} = 18{,}700$ CFS

FOR $Q_{P1} = 18{,}700$ STAGE = 12.0 FT

AREA = 8080 ∴ $V_1 = 668$

$Q_{P2(TRIAL)} = 18{,}700\left(1 - \frac{668}{4100}\right) = 18{,}700(1 - 0.163)$

$Q_{P2(TRIAL)} = 15{,}650$ STAGE = 11.4

AREA = 7102 $V_2 = 587$

$Q_{P2} = 18{,}700\left(1 - \frac{\frac{668+587}{2}}{4.100}\right) = 18{,}700\left(1 - \frac{628}{4100}\right)$ @1120 STAGE = 5.0 FT.

$Q_{P2} = 15{,}840$ ∴ STAGE = 11.5 FT

STEP 3& 3RD REACH L = 6000 FT

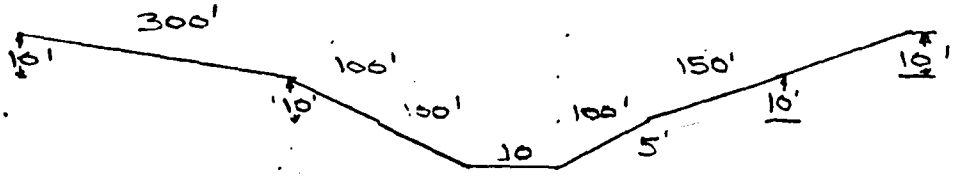
$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$Q_1 = 199\, A R^{2/3}$

$S = \frac{140 - 50}{5000} = .018$

$S^{1/2} = 0.134$

$n = .100$



H	ΔA	A	P	R	$R^{2/3}$	Q
5	550	550	210	5	2.93	3210
10	1363	1913	345	5.54	3.13	11,915
15	1988	3901	460	8.48	4.16	32,295
20						
25						

BY RFB DATE 5/7/79 **LOUIS BERGER & ASSOCIATES INC.** SHEET NO. 1

CHKD. BY ____ DATE ____ INSPECTION DAM PROJECT ____

SUBJECT LAKE KENOMOC, H&H, DOWNSTREAM HAZARD ANALYSIS

STEP 4 3RD REACH $Q_{P1} = 15{,}840$ CFS

FOR $Q_{P1} = 15{,}840$ STAGE = 11.2

AREA = 2390 $V_1 = 329$

Q_{P2} (TRIAL) $= 15840 \left(1 - \frac{329}{4100}\right) = 15840 (1 - .080)$

Q_{P2} (TRIAL) = 14 573 CFS STAGE 10.7

AREA = 2191 $V_2 = 302$

$Q_{P2} = 15{,}840 \left(1 - \frac{\frac{329+302}{2}}{4100}\right) = 15{,}840 (1 - .065)$

Q_{P2} = 14810 STAGE = 10.8

FOR 1120 STAGE = 3.8'

STAGE

STA to STA		@ Q_{P2}	@ 1120	Δ STAGE
0+00	36+00	20.2	6.2	14.0
36+00	72+00	11.5	5.0	6.5
72+00	122+00	10.8	3.8	7.0

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NO.	DIVISION	STATE	COUNTY	CONGR. DIST.	STATE	COUNTY	CONGR. DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
CT	152	[illegible]	CT	011	02				LAKE KONOMOC DAM	41 3.9	7210.9	25APR77

POPULAR NAME	NAME OF IMPOUNDMENT
	LAKE KONOMOC

REGION BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST FROM DAM (MI.)	POPULATION
01 07	LAKES POND BROOK	WATERFORD	4	17200

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT)	HYDRAULIC HEIGHT (FT)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	NORMAL (ACRE-FT)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
[illegible]	1927	S	23	23	[illegible]	200	NED	N	N	N	N	25APR77

REMARKS

[illegible] BUILT [illegible] 1927 [illegible]

D/S HAS	SPILLWAY TYPE	SPILLWAY WIDTH	MAXIMUM DISCHARGE (FT)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	NAVIGATION LOCKS
1	5	92	1845	27500			

OWNER	ENGINEERING BY	CONSTRUCTION BY
CITY OF NEW LONDON	FAY,SPOFFARD + THORNDIKE	FRA[illegible] SHIELDS,INC

REGULATORY AGENCY

DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	CT DEP

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
LOUIS BERGER + ASSOCIATES,INC.	25APR79	PL92-367

REMARKS

47 + 48 FJR 1969 + 1969 RECONSTRUCTION SPILLES [illegible] INCLUDE 4 DIKES

This Phase I Inspection Report [illegible] Konomoc Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Joseph W. Finegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

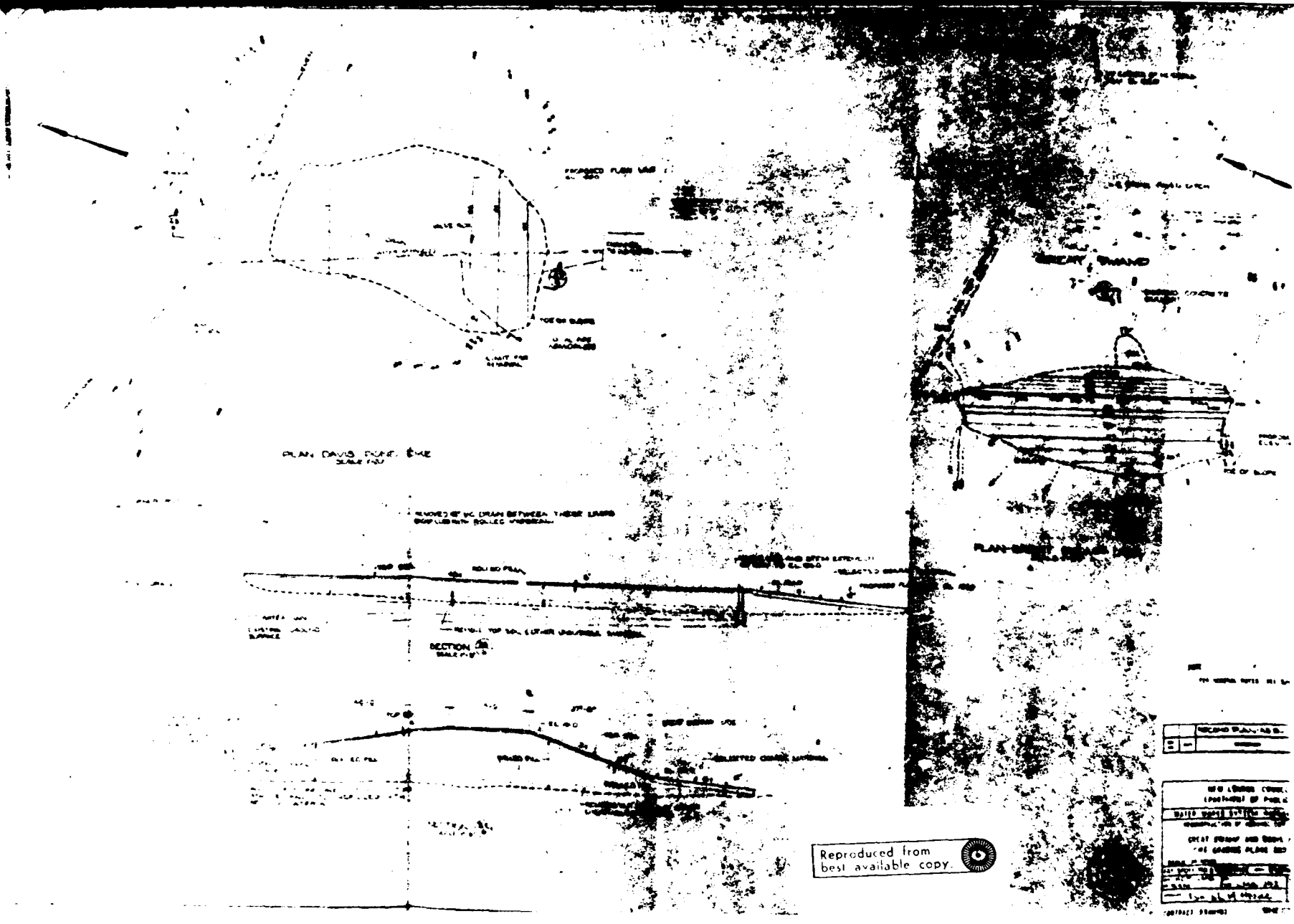
Joseph A. McElroy

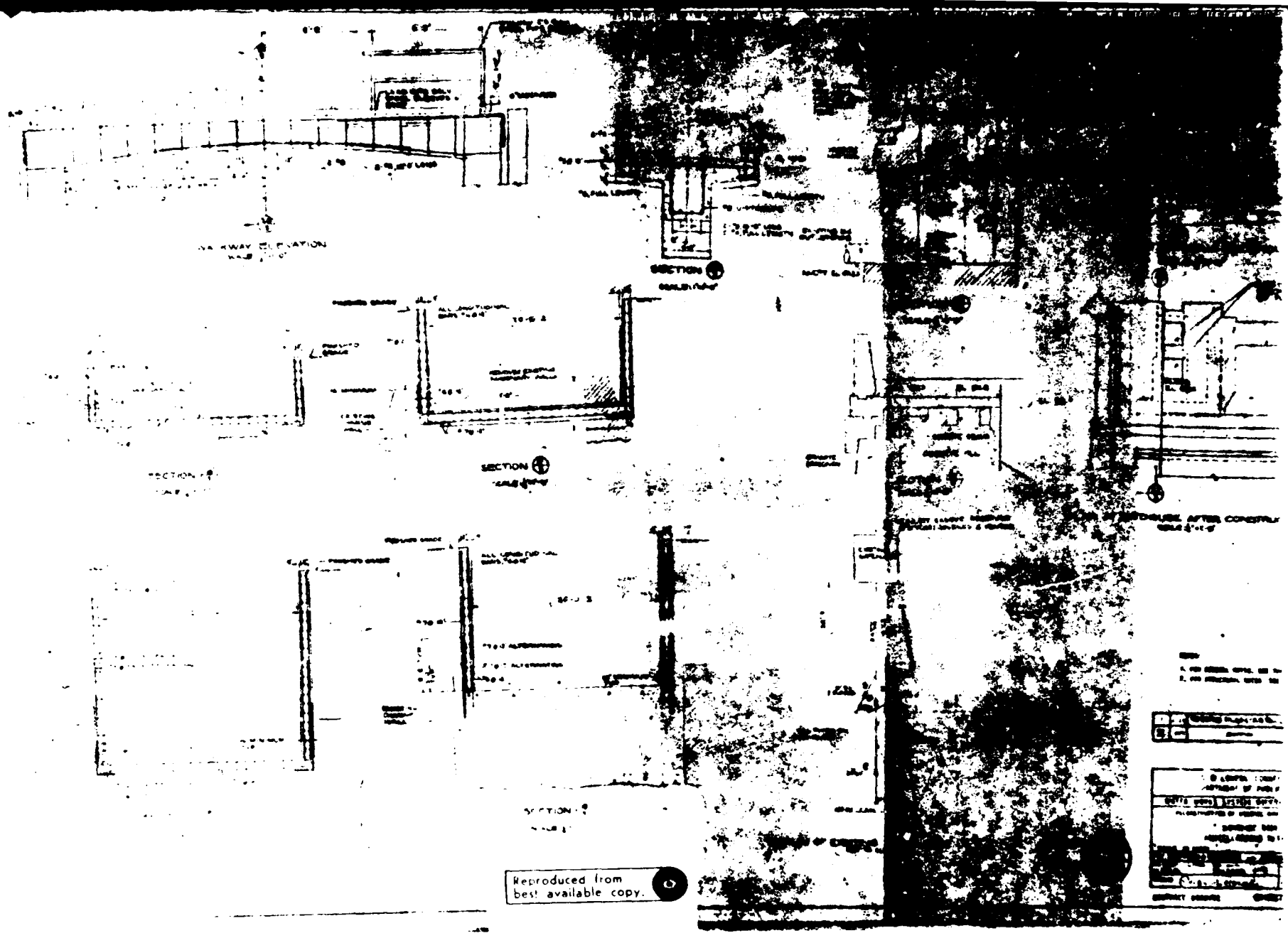
JOSEPH A. MCELROY, CHAIRMAN
Chief, NED Materials Testing Lab.
Foundations & Materials Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division




SECTION
SECTION
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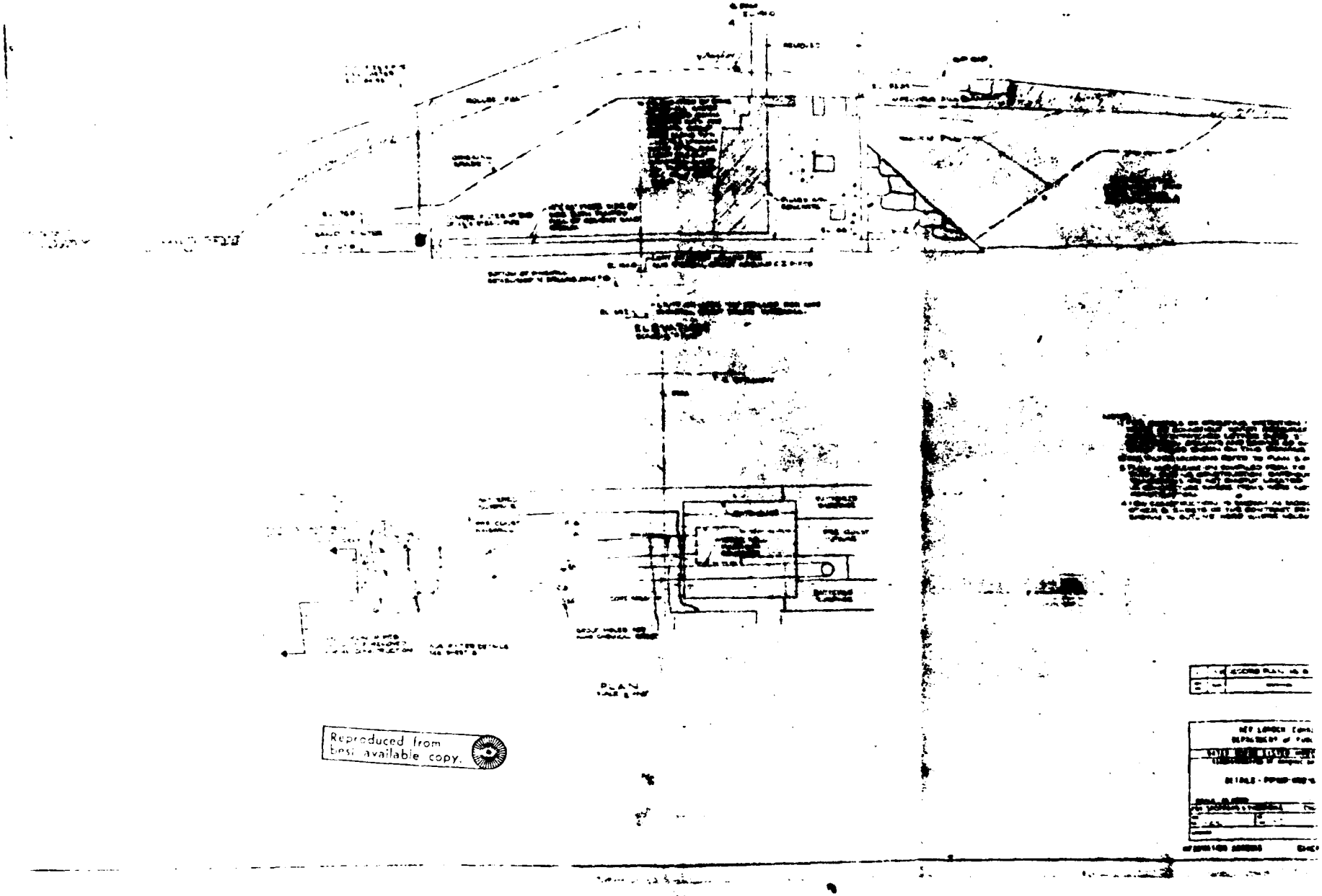
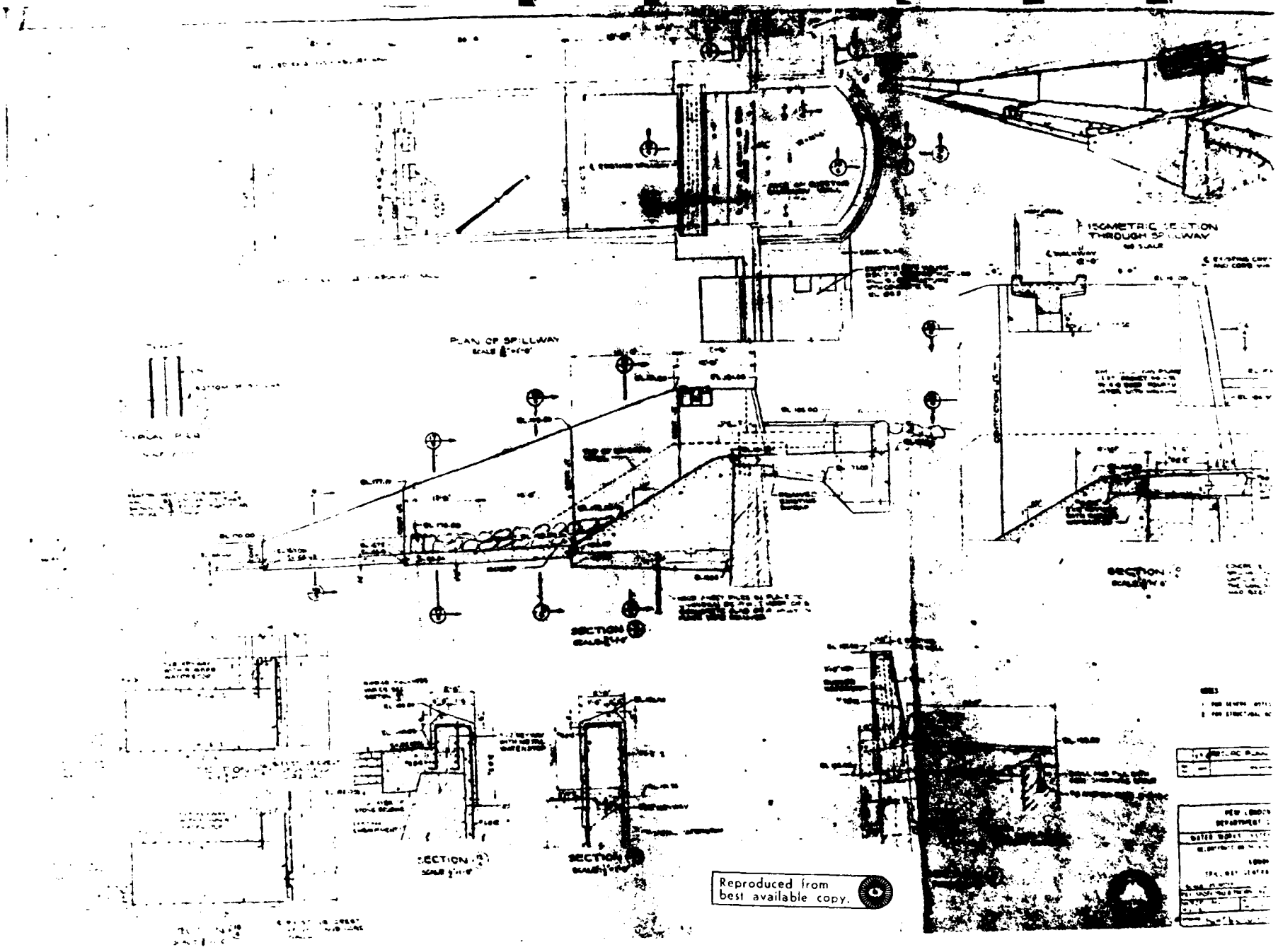
best available copy.




ISOMETRIC SECTION
THROUGH SPILLWAY
PLAN OF SPILLWAY
SECTION
SECTION
SECTION
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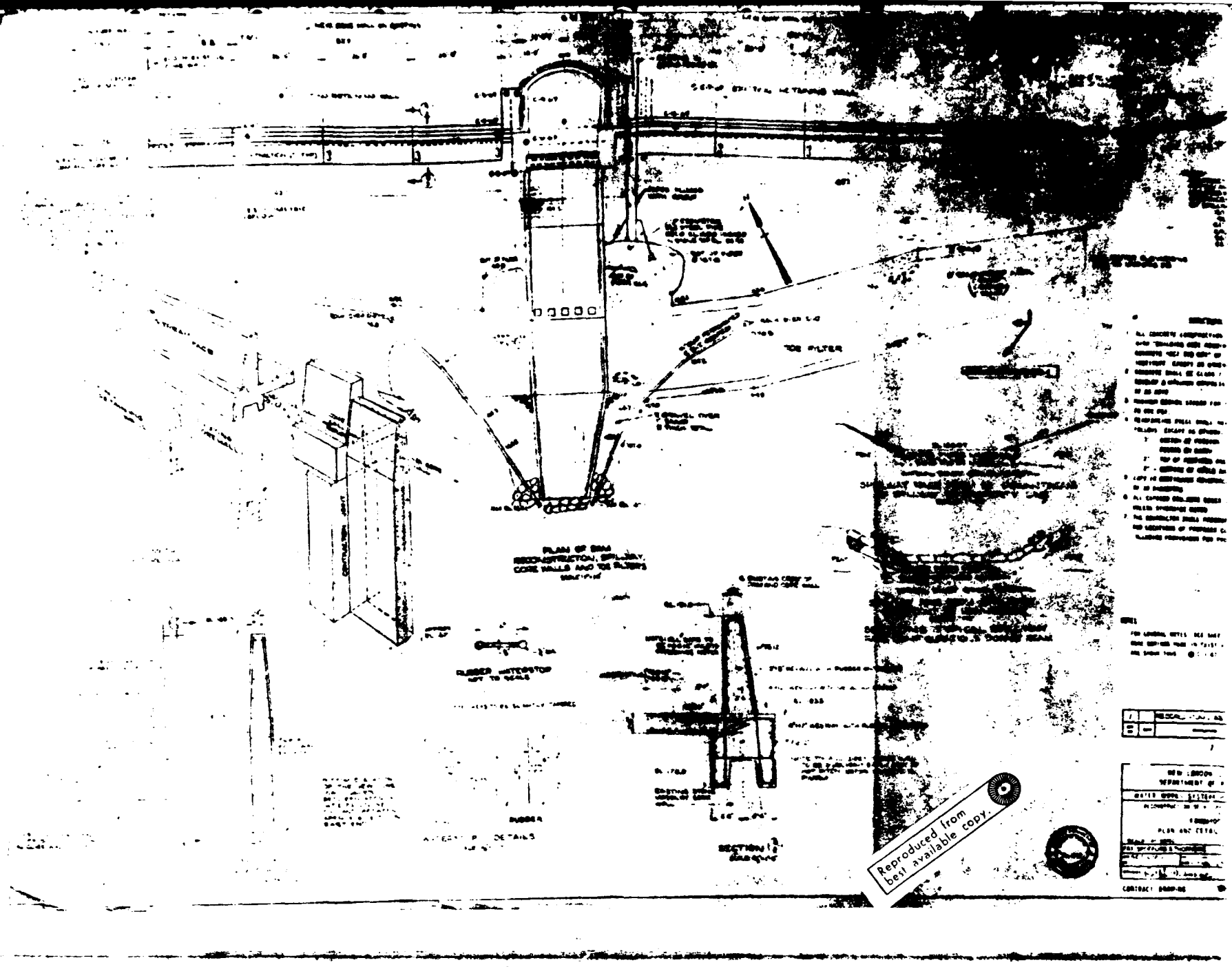
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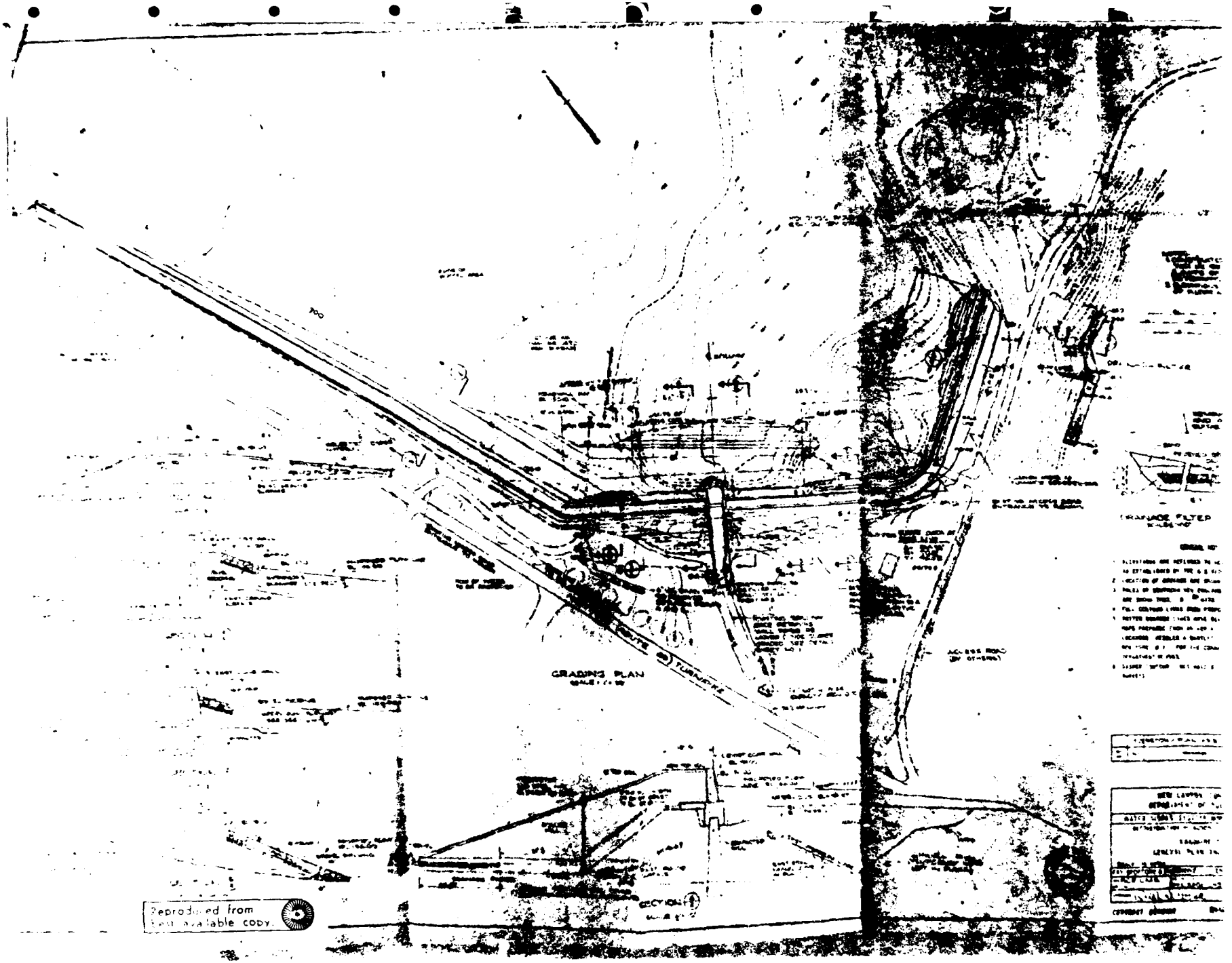
GRADING PLAN
ROUTE 29 TURNPIKE
SECTION
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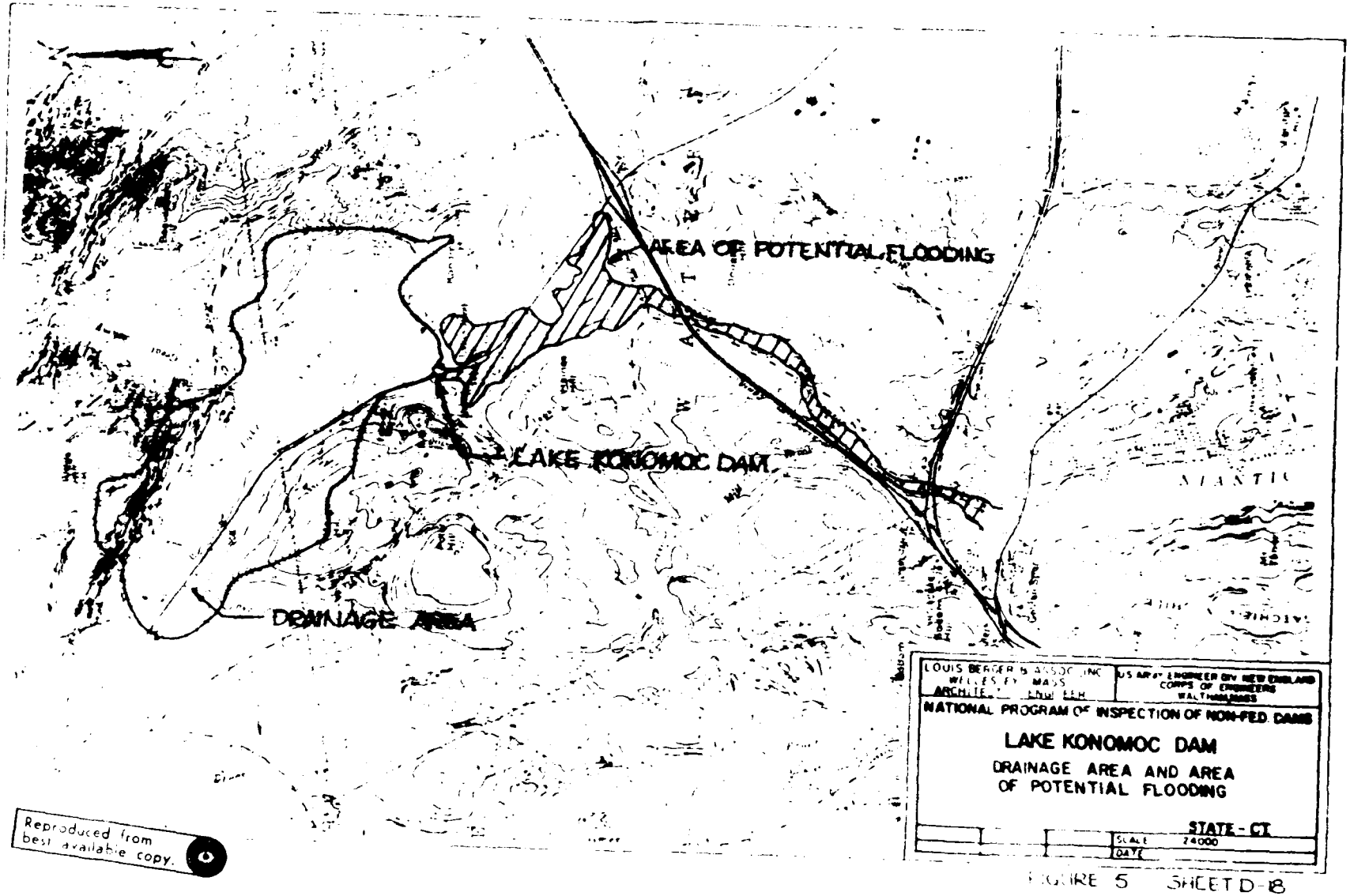
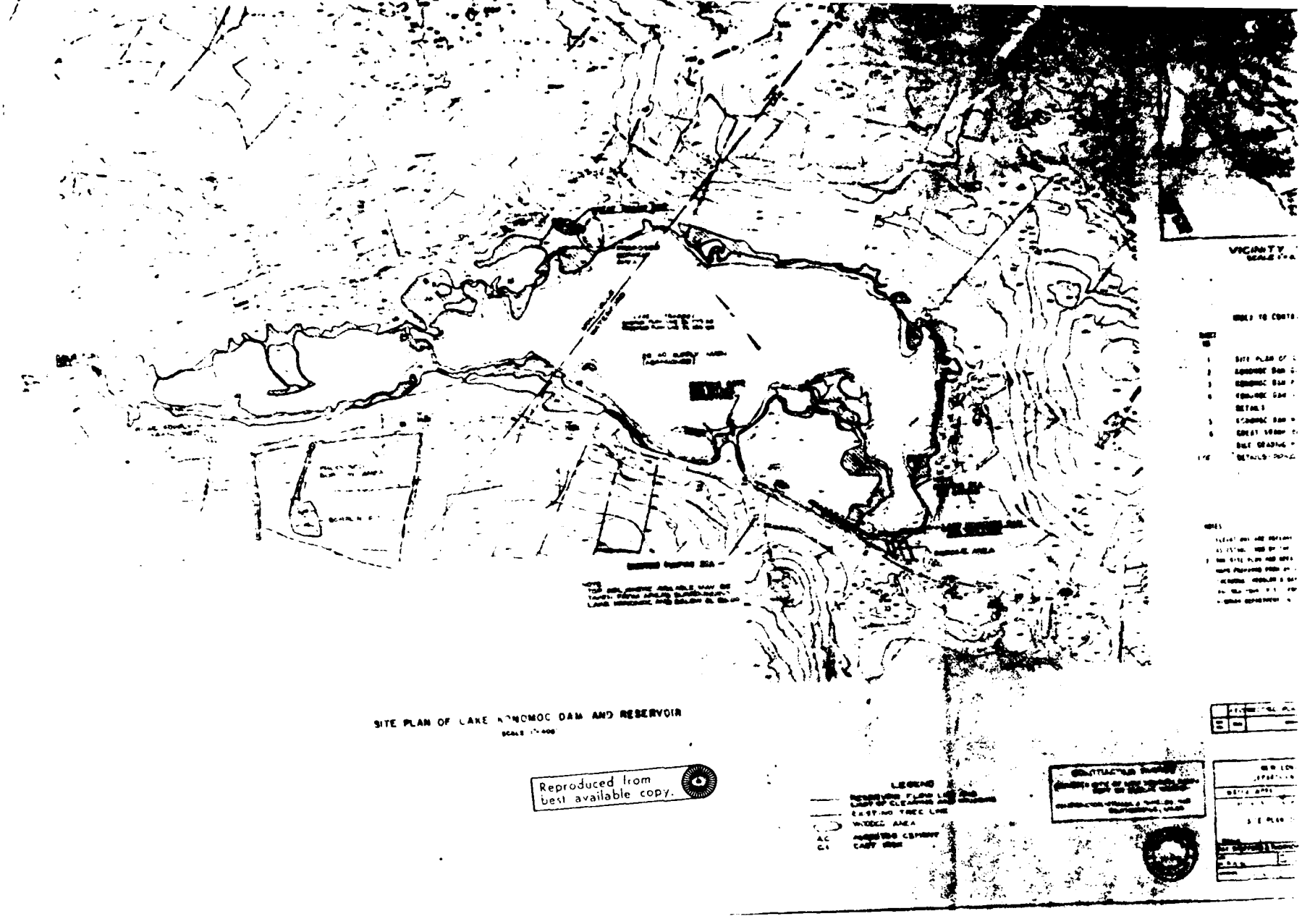


FIGURE 5 SHEET D-18


SITE PLAN OF LAKE
DAM AND RESERVOIR
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